

SPECIAL IRON AND STEEL EDITION

MANUFACTURERS' RECORD

A WEEKLY SOUTHERN INDUSTRIAL
RAILROAD & FINANCIAL NEWSPAPER.

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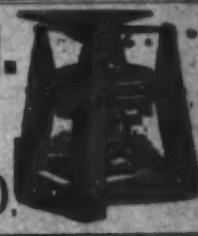


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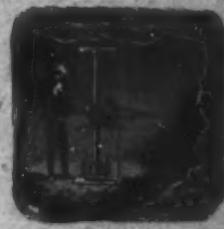
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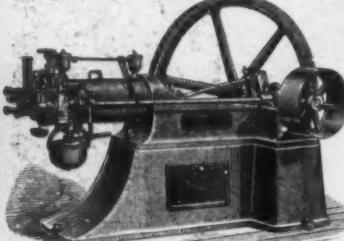
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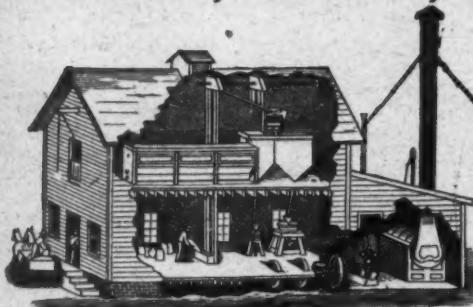
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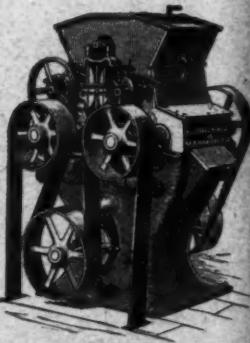
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BALTIMORE, SEPTEMBER 27, 1890.

What the Foreign Visitors Will See in the South.

As the representative of the industrial interests of the Southern States the MANUFACTURERS' RECORD extends to the members of the foreign iron and steel institutes a most cordial welcome to the South. It is an old country and yet a new one. Five years ago it was almost purely agricultural, and had not recovered from the overwhelming disasters of the late war. Now it is rapidly becoming an industrial region. It is building towns, furnaces, rolling mills, steel works and kindred enterprises with tremendous energy. Its vast mineral wealth is even yet scarcely realized, and its richest mineral regions have scarcely been explored. It can show to its distinguished visitors what it has accomplished in five years in the way of industrial development; but, far greater than this, it can show them the unlimited possibilities of the future. It can show them some of its coal regions and some of its ore banks, but much of the best of its mineral wealth is not yet reached by railroads, and those who examine only the iron and coal that is tributary to the railroads now in operation, however much impressed they may be, will still have but a faint

conception of the vastness of the South's mineral resources.

Gentlemen, the South extends to you a hearty invitation to come and see for yourselves what it has, what competition you must inevitably meet from it in the struggle for the control of the world's iron and steel trade, and what unequalled opportunities it offers for investment in the development of its industrial interests.

THE MANUFACTURERS' RECORD takes great pleasure in laying before its readers to-day a most elaborate article, covering the iron and steel trade of the world, by Hon. Edward Atkinson. We regret, however, that Mr. Atkinson still adheres to his free-trade opinions regarding free ore, coal, etc. The enormous demand that he foresees for pig iron, and which he thinks necessitates free ore, can be supplied from the exhaustless treasury of ore in the South, and the MANUFACTURERS' RECORD believes in protection to Southern ore, coal and pig iron.

ONE of the most prominent operators in the South, who has just purchased a large factory which will have a capital of \$1,000,000, writes: "I read your paper weekly, and believe it has been instrumental in having more money invested in the South than all the balance of the journals in the country. I first learned of this factory through your columns. The money invested in the MANUFACTURERS' RECORD has been the best investment ever made in the South for the South."

THE National Corporation Reporter is a new publication which has just been launched at Chicago. We judge from the following that the Reporter's mental eyesight is not at all affected by strabismus:

We take occasion to say that the MANUFACTURERS' RECORD is a valuable and prosperous publication, and will have a weekly welcome at this office.

Edward Atkinson Reviews the World's Iron Trade, and Predicts That the Center of Production Will Be in the South.

In view of the visit of five or six hundred of the leading iron and steel makers of Europe to the United States in October to spend a month studying the iron and steel making resources of this country, Hon. Edward Atkinson, of Boston, contributes to this week's issue of the MANUFACTURERS' RECORD an elaborate paper on the iron and steel interests of the world. Mr. Atkinson's paper is the result of several months' study of the subject, and of the most elaborate investigation. Starting out with the statement that "since the foundation of modern industry and of commerce is based upon the non-precious metals, and more than any other upon iron, it becomes of national importance to determine the future conditions of the production of this imperial metal," Mr. Atkinson shows that this country is the greatest consumer of iron and steel in the world. Owing to the nearness of the ores and coal in parts of this country, as against the long haul or transportation of ores from Spain and Africa to Great Britain, and the increased depth and heat of the coal mines of England, he believes that iron and steel will be made in this country at as low a cost as in England, notwithstanding the higher wages in the United States. Mr. Atkinson believes that the world's consumption of iron and steel, which is now increasing so rapidly, will for the next ten years fully tax the productive powers of this and all other iron-making countries to keep up with it, and hence that while there may be fluctuations, prices on the whole

must steadily tend upwards throughout the world. Basing his estimates on careful calculations made by himself, by Hon. Abram S. Hewitt and others, he holds that the present world's production of 28,000,000 net tons of pig iron, of which the United States will make during 1890 about 10,000,000 tons, must within the next ten years, or in 1900, be increased to not less than 44,000,000 tons, even at the lowest possible rate of increase, based on the rate of growth that has continued from 1856 up to the present time, while the rate of increase of late years, during which the demand for iron has so broadened, would show that the world will need and must have not less than 56,000,000 tons in 1900. These calculations are based on the normal rate of growth for the last fifty years, and do not take into consideration the possibility, and, in fact, the almost certainty, of a greatly increased demand by reason of the opening up of Africa and Asia. On this point Mr. Atkinson says:

"Great continents are now being developed by the railway, and the construction of the railway leads to a continuous demand for iron and coal for use in other purposes. We may not attempt to forecast the increasing demand for iron which would ensue from the construction of the Trans-Siberian Railway, or of the railways which will soon open South-eastern Europe and Western Asia, or of the railways which may parallel the Euphrates. We need not now consider what would ensue when China begins to build railways, because China contains within its own borders iron and coal in abundance. We may not compute the demands of the great continent of Africa, which is now sure to be opened in every direction by the railway. Let

us limit our own consideration for the moment to the development of the continents of North and South America, especially the latter."

This enormous increase in the demand for iron and steel will, Mr. Atkinson claims, require the utmost effort of production at every point where the raw materials can be assembled at reasonable cost, and where furnaces can be operated to advantage either upon the European or North American continent.

It is in the South, however, that Mr. Atkinson believes the world's iron and steel production will center, and this industrial advance "may," he says, "and probably will settle the race question. It will stop the contention in regard to the relative position of the black man and the white man in the Southern States, because social prejudices cannot stand against industrial forces. The causes of contention, of doubt, and of distrust cannot fail to be almost wholly removed by the development of the iron industry of the Southern States, in which the black man will be a most important if not the paramount factor."

Mr. Atkinson publishes in full, as a substantiation of the South's position, a letter from Col. Geo. B. Cowlam, of Knoxville, Tenn., and Major Goldsmith B. West, of Jacksonville, Ala., than whom there are no better authorities on the South's resources, setting forth the mineral wealth of the Central Appalachian region of the South, and a lengthy statement from Hon. Abram S. Hewitt on the same subject, in which Mr. Hewitt says that there are vast bodies of magnetic ores in that region suitable for making Bessemer steel so close to the coal that his calculations showed that Bessemer pig iron could be produced there at not over ten dollars a ton. Col. Cowlam says:

"Comparatively speaking, this Southern Appalachian coal field contains forty times the amount of coal, accessible to economical production and distribution, contained in the coal field of Great Britain before a pick was struck in the ground. The coal field, as a whole, is heavily timbered with virgin forests of white, red, black, Spanish, chestnut and post oaks, yellow poplar, white and yellow pine, hickory, chestnut and other valuable woods. Its soil of sandy loam produces good crops of grass and small grain, and is especially productive of fine fruit and vegetable crops, and enriched by lime or phosphates or by grass crops

turned under becomes very fertile farming land. Its bracing, dry air and pleasant temperature give the region very remarkable exemption from fevers and pulmonary diseases, and its frequent summer rains, brought about by its elevation, save its soil from summer drouth. All the natural conditions are favorable for economical mining and cheap and comfortable living."

In addition to the vast quantities of fossil and brown hematite ores, he says that "in the mountain strip made up of the great mountain chains of the South, the highest ranges east of the Rocky mountains, and embracing all the formations from the lower measures of the Lower Silurian down to the oldest of the crystalline rocks from Maryland through Virginia, North Carolina and South Carolina and into Georgia, there have been found large beds of very high grade iron ores, mainly magnetites and more rarely specular ores. The magnetites range from 50 per cent. up to as high as 69 per cent. metallic iron, very low in silica, ranging from $\frac{1}{2}$ per cent. up to 5 or 6 per cent., and in the ores of lower percentage from 1 to 7 per cent. of metallic manganese, or, in other words, pure Bessemer ores, the phosphorus ranging generally from 0.003 to 0.008, and not running anywhere above 0.025, and free from sulphur. The quantity and quality of the Bessemer ores of the Southern Appalachian region is, beyond all question, sufficient to meet present and prospective demand for many generations. It is a question of accessibility to the railway lines and of the construction of railways to permit their development, and not a question of quantity or quality."

"Supremacy in the production of iron," says Mr. Atkinson, "must go to the point where the facilities for working the mines and the cost of assembling the materials at the furnace are least, because at that point the highest wages can be paid for skilled workmen, accompanied by the lowest cost of production, which will be due to such favorable conditions.

"When this great section of heavily timbered mountain ranges and broad, high valleys sometimes called 'The Land of the Sky,' which had been kept from view by the surrounding pall of slavery, first began to be opened, the writer ventured to describe it with the Cumberland and Piedmont plateaus on either flank and the high uplands of Georgia and Alabama on the south, as comprising an area nearly as large as France

and twice the area of Great Britain, containing a potential in agriculture equal to either and minerals and timber equal to both combined." After giving in detail the reasons for the South's position in iron making, by virtue of its abundance of raw materials, Mr. Atkinson, says:

"One may not venture yet to name the specific place or places. The survival of the fittest among the many enterprises now claiming public attention will soon determine it in the emulation between the North, the South and the West.

"Suffice it that if one should stand upon the top of the highest peak among the Great Smoky mountains in the heart of the Southern Appalachian chain, and could bring within his vision all that would come within a radius of seventy-five to a hundred miles, he might be able to establish the center of an iron and steel production which would not be far away from what has been called the 'center of gravity' of the population of this country.

"If he could then bring within his vision the whole configuration of the area enclosed within a circle of about one hundred and fifty miles in diameter, centering on the Great Smoky mountains, he might trace the lines made by the erosion of the rivers and the gaps in the ranges on which the rails may be laid to the northwest at the southern border of Ohio, and to the southeast on the way toward the Atlantic ports of South Carolina, over which the metal produced at the possible future center of the iron production of this country may be distributed on the easiest grades either for domestic consumption or for the supply of foreign markets."

IN an interview with the Boston Advertiser, Mr. J. M. Vernon, of the Fort Payne Herald, says:

One of the most promising signs of the times is the transfer of some of the largest woodworking establishments of Michigan to the South. It is well known that the timber forests of Michigan are fast disappearing. Like the sharp, shrewd Yankee, who can see away ahead and fully realizes that the successful furnaces of the future must be built in close proximity to the base of supplies, the leading lumber men of the West are buying up timber lands and transferring their base of operations to those portions of the South where immense forests of pine and poplar abound. Of course the building of prosperous new towns must benefit the great commercial centers of the South, but the general tendency of investors is to put their money into the new places which have unquestioned resources. It requires less capital, and there are much better chances of large returns.

Bessemer Ores in Abundance.

Hon. Abram S. Hewitt says that there are vast bodies of Bessemer iron ores in the South, and that there are points in that section where Bessemer pig iron can be made at not over \$10 a ton. Will the skeptics deny the correctness of Mr. Hewitt's statements? Col. George B. Cowlam, of Knoxville, Tenn., who is one of the best posted men in the country on the South's mineral interests, and who for many years has devoted his entire time to the most thorough investigation of the Central Appalachian region of that section—the same country referred to by Mr. Hewitt—states in his letter to Hon. Edward Atkinson, published in this issue of the MANUFACTURERS' RECORD, that there are practically unlimited supplies of Bessemer ores there running up to 69 per cent. metallic iron and as low as 0.003 and 0.008, and none running above 0.025 of phosphorus. From personal knowledge of these ores the MANUFACTURERS' RECORD is able to fully endorse Col. Cowlam's statements, and to guarantee that the ores to which he refers, and which are sufficient in quantity to meet the largest demand that can be made for generations to come, are not surpassed in quality anywhere in this country. They can be mined at the minimum of cost, and are near to the finest coking coal in the country. These ores are not limited to one particular body. They are found over a country many miles in extent. The MANUFACTURERS' RECORD repeats its statement, made many times in the past, that the best and richest ore fields of the South have not yet been opened up, and that of the marvellous mineral wealth of this region not the half nor the tenth has been told. We know whereof we speak.

Southern-Made Steel.

The commencement of work at the great steel plant in Chattanooga and the successful production of high-grade steel marks an important event in the industrial history of the United States. It is but the beginning of the fulfillment of the predictions made for several years by the MANUFACTURERS' RECORD that the South would soon take as active a part in the production of steel as it now does in iron making. Southern-made steel will soon force its way into all parts of the country, as Southern iron has done. Steel works of great magnitude will be built at a number of Southern points, and this great industry will be pushed with the same vigor that has marked the iron trade. Readers of the elaborate article by Mr. Edward Atkinson in this issue of the MANUFACTURERS' RECORD will see that there is no danger of overdoing the iron and steel-making business. In fact, his figures show that it will be difficult to build furnaces rapidly enough to meet the ever-increasing demand for iron throughout the world. According to his facts iron and steel enterprises must prove very profitable investments.

THE FUTURE SITUS

OF THE

Principal Iron Production of the World

WHERE IS IT?

BY EDWARD ATKINSON.

The joint meeting of the British Iron and Steel Institute, and of the American Institute of Mining Engineers, which is presently to be held in this country, makes this a fitting occasion to submit a few figures and some remarks upon this branch of industry. This statement will be made in the simplest way. The writer has no personal interest, either in the production or the use of iron, and possesses no technical knowledge of the arts connected therewith.

If the subject were to be treated only as a question of profit or loss in connection with a branch of industry which gives occupation to a very small fraction even of the people of those countries in which the greatest quantity of iron is produced, the matter would be of merely personal and technical interest. But since the foundation of modern industry and of commerce is based upon the non-precious metals, and more than any other upon iron, it becomes of national importance to determine the future conditions of the production of this imperial metal.

The history of commerce in its broad sense has yet to be written. When it is written the inventor will displace the dynastic ruler as the representative of power. It is but little more than a century since the methods were invented for smelting iron ore with mineral coal. This art had been so little developed until near the end of the last century as to have kept the iron masters of Great Britain in constant fear of the development of the charcoal iron industry of the colonies of America. The attempt to suppress the working of metals and fibres into fabrics in the colonies of North America, and to restrict the traffic in them by acts of Parliament, was one of the prime causes of the Revolutionary war. It was not until the subsequent inventions in metallurgy had been combined with the application of steam in the development of force or energy that the supremacy of England manifested itself and gave to Great Britain the huge strength and wealth by which she was enabled to conduct the contest with Napoleon in large measure by subsidizing other nations and furnishing the materials for the conduct of the great wars of that period.

The control of considerable deposits of ore and coal capable of being converted into iron, which were then the most extensive of the known sources of iron, enabled Great Britain to maintain her supremacy down to the beginning of what may be called the age of steel. Although her product of iron was then relatively insignificant as compared to what it now is, yet being relatively far greater than that of any other country, it gave her the supremacy, almost the monopoly, in the conversion of crude iron into higher forms.

The age of steel may be dated from the application of the inventions of Bessemer, perfected and improved by Holley, and continued by the application of the subsequent inventions of Siemens, Martin, Gilchrist, Thomas, Reese, and others too numerous to be named.

It was not until the application of the so-called basic process to the phosphoric ores of Germany that any considerable competition with England was established in Europe.

Great Britain may have been greatly aided in maintaining her supremacy in the production of both iron and steel, but yet more in the conversion of these metals into their higher forms of machinery, ships, railway equipment and the like, by the policy of this country. Had it not been for the heavy duties upon iron and steel which were imposed in 1861 under the necessity of war, the excessive demands of this country upon the ore-beds and the iron and steel works of Great Britain, even under the low revenue rates of duty established by the tariff of 1857, might have developed the scarcity of fine ores suitable for making steel, and would probably have led to the present high cost of coal and coke and to the increase of wages in this branch of industry in Great Britain, many years since.

The statistics which will presently be given prove that for many years the consumption of iron in the United States has much exceeded the production, and is now very nearly, if not absolutely, 40 per cent. of the total registered product of the world. It is, therefore, manifest that the effect of the duties upon iron, while keeping the price higher in the United States than it would otherwise have been, has also been to keep the price lower in Great Britain for lack of our demand. This effect upon relative prices year by year must be admitted, whatever the actual prices in each year may have been.

But little attention has yet been given to this matter of the relative prices of crude materials, especially of iron and steel, in the discussion of the financial policy of this country. The very worst effect of a duty or tax upon a crude material which is of necessary use in domestic industry is when it has apparently reduced the price, but has yet kept it relatively higher than ever before in comparison with other countries where no duty is imposed. I do not refer to this matter now for the purpose of treating our own tariff policy, but for the reason that the time when the future "center of gravity" of iron production will be established in one country or the other will depend in some measure upon legislation; and it would hardly be suitable to deal with this problem without treating some of the less important factors, of which the tariff policy of the United States is one.

It is quite possible, but not provable, that, owing to the stimulus given to the development of iron mines and works in this country by the duties upon the import of foreign iron and steel, the quantity of iron produced in the aggregate in all countries may have been increased so that the price, taken as a whole, may have been diminished more rapidly than it would otherwise have been. The erection of furnaces in the

United States probably threw a good many old English furnaces out of blast, and to some extent may have prevented others being worked to full capacity.

But it is not a matter of any grave importance whether the price of crude iron shall be a few dollars a ton more or less to the consumers of this country, since the entire consumption of iron in its crude condition constitutes a very small fraction of the total consumption of the nation. As a separate branch of industry iron mines and blast furnaces support a much less number of persons than the raising of poultry and eggs, the value of which doubtless exceed the annual value of pig iron by 100 per cent.

It is only as a basis for the conversion of iron into higher forms for final consumption that the art assumes its supreme importance, since the heavy cost of transportation in ratio to the value of crude iron of necessity brings the consumption into the heavier forms of production as near the point of production as may be.

The benefit, if any there has been, due to the rapid reduction in the price of iron in this country, and the equally rapid and greater reduction in the price in Great Britain, both being measured at the standard of gold, must have been more than counterbalanced by the *disparity* in the price of this most important crude material to which the consumers of this country have been subjected for many years and down to the year 1889, in consequence of heavy duties on imports, when the increasing cost and higher prices of coal and iron in Europe began to do away with that disparity.

The excess in the cost of iron supplied to consumers in this country as compared to the cost to consumers supplied by British mines and works has been computed by David A. Wells, A. B. Farquhar, of York, Pa., and myself at a sum varying from fifty to eighty million dollars a year for the ten years preceding the year 1889. This disparity or handicap of not less than five and possibly, or even probably, eight hundred million dollars in ten years, has rendered the competition of this country with Great Britain and with Germany, in the conversion of crude iron into higher forms, a very difficult one. We have not even been able to hold our home market. We have been large importers of machinery, tools, railway bars and the like, while our exports of tools, machinery, engines and the like have been very small as compared to what they would have been had the price of iron been the same in both countries, while our opportunity to build steamships for ocean traffic has been entirely taken away from us. One can infer what our exports would have been from the facts that, in spite of an average excess in the price of iron, and yet more on steel, for ten years, we yet export agricultural tools, sewing machines, engines and many other of the higher forms of metal to all parts of the world.

In respect to home industry, such is the advantage of position of the people of the United States, such their productive power relative to other countries, and such their advantage in general conditions, as to have made this country the greatest consumer of iron and steel of the whole world. There is probably no better standard of the general progress of a community in material welfare than the standard of the consumption of iron when converted into its higher forms for final uses. Compared to this the production of iron is of no relative importance whatever, except as it may affect consumption.

If, in addition to our power of consumption, we may soon develop facilities for the largest production of iron at the lowest cost, yet at the highest rates of wages earned anywhere in this branch of industry, whereby the duties upon foreign metal may be rendered inoperative and may then be wholly removed without objection from anyone, then the future situs of what may be called the *CENTER OF GRAVITY* in the production of iron may soon be determined, and the largest production may be coupled with the largest consumption of iron both for domestic and for foreign use.

If our natural advantages are so great as to have enabled us to surmount the disadvantage in consumption, due to the high tariff and the great disparity in price; if our control of natural resources is so great as to render it a matter of very slight importance whether there be a duty on the imports of wool, of coal, ore and iron or not, then we may assume the paramount position in foreign commerce as well as in domestic agriculture and manufactures; and to that end all forces, social and political, are now tending.

If such is the direction in which social forces are now working, the tariff question may soon cease to be of any consequence even to those who have heretofore considered what is called the protection of a tariff of grave importance to themselves.

In other words, if the relation of the ores and coal of this country to each other in point of distance, and if the position of these deposits in relation to the surface of the ground are such as to enable those who are engaged in this branch of industry in this country to produce a ton of iron or steel by the exertion of four to eight days' work, when in consequence of the long haul or transportation of ores from Spain, Sweden and Africa to Great Britain and the increased depth and heat of the mines of Great Britain, it is necessary to expend eight, twelve or sixteen days of labor upon the ton of iron or steel, then it would follow as a matter of course that in the competition to supply points that can be reached at the same rates of freight on the metallic iron, or on the heavier products of iron and steel, our iron would have the advantage in being made at high wages, and yet at low cost as compared to the low wages and high cost which must be established under the conditions of scarcity of fine ores, the high cost of coke, and the advancing cost of production now apparent in Europe, and especially in Great Britain.

It might appear from what has been said, that if one were afflicted with *Anglophobia*, the most effective method of working to the displacement of Great Britain in the supremacy of commerce would be to remove all our own duties on the crude and partly manufactured materials which are necessary in the processes of our domestic industry, especially from coal, ore, iron and steel, in order that we might enter the competition with her, free from the handicap which has made us lag in the race for so many years.

It is undoubtedly true, as it has been frequently pointed out by the statesmen and economists of England, as well as to her principal machinists and workers in metal, that when this country adopts such a policy, a huge impetus will be given to our domestic industry, and for the time being some branches of work in other countries, especially in Great Britain, may suffer. But there are higher and better reasons for adopting this policy of exemption from taxation upon crude or partly converted materials than any prejudice or desire to harm our neighbors. When the subsequent figures which are given in this paper shall have been considered, it may become apparent to every one who is capable of reasoning upon the subject, that it will soon become absolutely necessary to remove all duties on ore and coal in the United States, and perhaps expedient to remove at once or very soon all duties on crude metal, so that not only the mines and works of Europe and of the United States, but also the mines and deposits of ore of Cuba and of Canada, may be worked in the most effectual manner.

If the forecast upon which I have ventured in this analysis shall be as truly prophetic as that of Mr. Abram S. Hewitt, to which I shall presently refer, which was made in 1856, then it will happen that all the existing mines and furnaces which can be in any manner operated to advantage anywhere, either upon the European or the North

American Continent, will be pushed to their utmost production in order to keep pace with the increasing demand upon them, not only from the countries in which they are situated, but also from the rest of the world.

In other words, if the figures subsequently given mean what they appear to, the immediate demand for iron will require the utmost effort to maintain the supply at every point where the materials can be assembled at reasonable cost. Under such conditions, while there may be temporary fluctuations and variations in price, the general tendency for many years to come must be upward rather than downward; therefore success or failure will turn wholly on the relative skill and capital which may be applied to the art in different places, as much as to the relative conditions.

Speculative and injudicious enterprises may fail; blast furnaces which are out of date, or those to which it may cost \$5 to \$8 per ton of product to bring the materials, may not continue in service, but well-placed furnaces conducted with energy, capital and with full attention to all the details of economy on which every branch of industry now rests, cannot fail to meet a continuous and profitable demand, without respect to legislation. Such legislation can only retard and alter the conditions in some slight measure, placing sections of this country at a disadvantage with respect to other sections, and depriving the people of some parts of the country of their equal rights in their competition for their share in the service in which all have a right to share alike.

From this point of view the facts and figures in regard to the present production and consumption of iron, and the figures of the probable demand of the world in the near future, which may be based on the law of accelerating demand, and which are developed by a consideration of the statistics of the past, will be of very great interest. In other words, if it be admitted that the paramount control of the most available deposits of coal and of iron ore gave the dominant position in manufacturing and in commerce to Great Britain in the early part of the last century, then it may be asked why the present control of the most available deposits of ore and coal, capable of being converted into iron and steel at the highest rates of wages prevailing in this art anywhere, and yet at the lowest cost of labor, may not give the paramount position in commerce to the people of the United States in the early part of the next century or even sooner. I, however, submit the subsequent facts and figures as of interest to everyone, without asking anyone to agree with me in the deductions which I have drawn from them as to changes in our tariff policy.

Had I been aware before I sent out the missive of inquiry by which I have been enabled to compile the subsequent statistics that it was the intention of Mr. Abram S. Hewitt to deal with the same subject in an address which he may make at the coming Convention of the Iron Masters of the World, it would have been almost an impertinence for me to attempt to deal with a subject of which Mr. Hewitt is distinctly *primus inter pares* in his mastery of all facts relating to this art in this country. But I have been encouraged by him to complete my analysis, and he has courteously lent me a copy of his address given before the American Geographical and Statistical Society in 1856. In that address he made the first use of which there is any record of the graphical or line method of picturing figures and bringing before the eye the great facts in regard to the iron industry.

I have attained great confidence in the forecast on which I have ventured as to the future demand of the world by the accuracy with which Mr. Hewitt prophesied our present conditions; I will from time to time, in dealing with the figures of the present, make reference to his prophetic figures of the past.

In another aspect this question of iron production possesses great interest to the people of the United States. It may and probably will settle the race question. It will stop the contention in regard to the relative position of the black man and the white man in the Southern States, because social prejudices cannot stand against industrial forces. The causes of contention, of doubt, and of distrust cannot fail to be almost wholly removed by the development of the iron industry of the Southern States, in which the black man will be a most important if not the paramount factor.

It is, therefore, in the broad connection of this subject with human welfare that the facts and figures in regard to the production of iron become a matter of the utmost interest to the student of social science. It is in the development of these broader aspects of what is in itself a relatively small and unimportant branch of work in this country, that one who has neither personal interest nor technical knowledge of the subject may be justified in dealing with the elements of the case.

I have opened this subject in this way because the time has come when leading "iron masters," as they are called, of this country—men who control interests and establishments of great magnitude, who, if not yet a majority in number, are yet, perhaps, in capacity equal to a majority—fully coincide with the view of the writer, that the time for an artificial stimulus to the production of iron in this country has gone by, and that the time has come when true protection not only to the producers but to the consumers of iron may be found in removing all duties from ore and coal, and presently from all crude metals or other materials which are needed in the higher processes of manufacturing.

In the subsequent statistical analysis of the condition of the world in respect to the consumption of iron, it will appear that the United States now produce about thirty-five per cent. of the entire recorded product of iron of the world, and now consume nearly forty per cent. at the ratio of three hundred pounds or more per capita. There are four other countries which with the United States produce more than ninety per cent. of the entire product of the world, viz.: Great Britain, France, Belgium and Germany, including Luxemburg. The domestic consumption of these four countries, deducting exports, is one hundred and seventy-five pounds per head. The rest of the world, inhabited by twelve hundred out of the computed fourteen hundred millions of the population of the globe, consumes only eleven or twelve pounds per head.

Great continents are now being developed by the railway, and the construction of the railway leads to a continuous demand for iron and coal for use in other purposes. We may not attempt to forecast the increasing demand for iron which would ensue from the construction of the Trans-Siberian Railway, or of the railways which will soon open Southeastern Europe and Western Asia, or of the railways which may parallel the Euphrates. We need not now consider what would ensue when China begins to build railways, because China contains within its own borders iron and coal in abundance. We may not compute the demands of the great continent of Africa which is now sure to be opened in every direction by the railway. Let us limit our own consideration for the moment to the development of the continents of North and South America, especially the latter.

There lies at our door a continent containing seven million square miles, double the area of the United States, including Alaska, and without question containing a larger proportion of land available for cultivation than the entire area of the United

States, now hardly occupied, even putting aside a considerable part which, owing to tropical conditions, may not be densely occupied by white men. The continent of South America, while possessing both iron and coal, has not yet begun to work either with any effect. About fourteen thousand miles of railway have already been constructed upon this continent, most wholly in the southern parts, but gradually approaching the center, crossing the Andes, developing the great pampas or plains of the Argentine Republic and of Bolivia, and approaching the head-waters of the Amazon in the far interior.

How little we know or avail ourselves of this opportunity for commerce! Isolated by our own acts, we have removed ourselves far away from the people of these lands, when in point of fact the great port of Cartagena, on the Caribbean sea, from which a railway will soon be constructed, which will connect the whole southern and central system of South American railways with this northern port, is but three days' steaming distance from Tampa, three or four days from Pensacola, from Mobile and from New Orleans.

From the port of Cartagena a railway is now projected which is as sure to be built as that the sun shines. In one thousand miles of distance, gradually rising from the sea level to an elevation of about 4,000 feet, this railway will open the largest area of country now waiting for the settlement of the white man, and in eight hundred miles more will unite the whole railway system of the South American Continent in the closest connection with the United States. On this line are the great plains lying east of the Andes, high enough above the sea to be suitable in climate for work and welfare of white men. On this line there is but one difficult and short stretch of mountain country to be surmounted, with a summit to be overcome only sixty-four hundred feet above the sea level, to make the complete connection with the whole existing Southern railway system. When this great work is done Valparaiso will be brought within twelve days by rail and steam of the city of New York; the great cities in Peru, Bolivia and in other parts of South America nearer in time in proportion to their distance from the port of Cartagena. Close to the line now being opened by other railway enterprises are the mines of the precious metals, second only in their present output to any others.

What will be the demand of that continent when thus developed and connected directly with the United States upon the coal and iron of our southern country? What is necessary to that exchange except the enactment of treaties of Pan-American reciprocity or the removal of the obstructions to commerce which we have interposed by our heavy duties upon the crude products of wool, the copper ores and other crude materials with which the people of South America might purchase our coal, our iron, our manufactures of metal and our fabrics of all kinds?

Having thus attempted to stir the imagination and to bring into view the demands upon us which may come in the immediate future, we may now proceed to deal with the dry facts and figures relating to iron.

In order to make as complete and accurate a statement of the present and past conditions of the production of iron as might be possible at the present time, the writer lately sent a missive of inquiry containing most of the figures now submitted to all persons whom he had reason to believe would be able to detect any errors in the tables given or to point out any fallacy in the forecast ventured upon. In this way he has been enabled to make some slight changes in the tables first compiled, and to add information in the appendix in regard to deposits of ore suitable for conversion into Bessemer metal which have sometimes been thought to be wanting in the Southern Appalachian chain.

The writer's function is only to submit the case on the evidence which has been brought before him, which may or may not be adequate. It is for others to make a practical application of these alleged conditions after the most absolute verification at every point.

There is, perhaps, no branch of industry in which fortunes have been made or marred more quickly than in mining and metallurgy, yet no department of production is of more importance or more certain in its results if entered upon for the sole purpose of supplying metal for use. The writer has endeavored to submit the evidence on which the future progress in the iron industry may be predicated in such a guarded manner as may not lead to any distinct conclusion as to the superiority of any specific point over another, but to give in general terms the aspect of the case treated by sections of the United States in respect to production, but in specific figures as to countries.

In the following inquiry I shall only develop the figures which are given in the exhaustive reports of Mr. J. S. Jeans, secretary of the British Iron Trade Association, and of Mr. James M. Swank, secretary of the Iron and Steel Association of the United States, in order to attempt to predicate the future upon the past. I shall deal substantially in round figures, disregarding fractions; but since my factors will be the great masses of the population of the globe and of its principal iron-producing and iron-consuming sections divided into the tons registered, the margin for errors, even if errors there may be in my final results, will be so small that they may be wholly disregarded.

PRODUCTION.

The main period or unit of time covered by this treatise will be 1879 to 1889, inclusive, eleven years. This period is chosen because the tables of the product of the world have been fully established since 1878, so that absolute comparisons may be made in respect to the different quantities yielded by the iron-producing countries. This period is also a suitable one for treatment, because the increase in the product of iron has been somewhat phenomenal even in the face of declining prices. In the period immediately preceding this one, the great inflation in all prices which culminated in 1873, had been followed by great reductions in the general prices of all commodities down to the date of resumption of specie payments in the United States on the 1st of January, 1879, when a great change occurred. The data of prices in the period preceding January 1, 1879, from 1861, are wholly vitiated for statistical use or for purposes of comparison by the effect of the American civil war and the depreciation of the currency of the United States. In 1878 No. 1 anthracite foundry iron touched the lowest average ever reached in this country, \$17 $\frac{1}{2}$ per ton, in Philadelphia. Improvement began on a gold basis January 1, 1879, and was followed by a very prosperous year in the iron industry in 1880, when the average price of No. 1 foundry iron, in Philadelphia, was \$28 $\frac{1}{2}$ per ton. Since then fluctuations have occurred, accompanied by a downward tendency in the prices of iron until 1889, when the average price of foundry iron, in Philadelphia, was \$17 $\frac{1}{2}$ per ton. In the last report of the American Iron and Steel Association for the year 1889, Mr. Swank gives the figures of the production of iron which are commercially registered in the following table. This table exhibits in percentages the relative position of Great Britain, the United States, Germany, and all other iron and steel-producing countries in 1878 and 1889. Gross and metric tons are.

used (gross ton 2,240 pounds, metric ton 2,204 6-10 pounds). The small pig-iron production of Luxemburg is necessarily included with that of Germany.

| RELATIVE PRODUCTION OF PIG IRON BY COUNTRIES. | | | | | |
|-----------------------------------------------|-----------------|-----------------|--------|--------|-----------------------|
| Countries. | Tons. | Percentage. | 1878. | 1889. | Increase or decrease. |
| Great Britain | 1878. 6,381,051 | 1889. 8,245,336 | 45.20 | 33.16 | 1,864,015 |
| United States | 2,301,215 | 7,603,642 | 16.30 | 30.57 | 5,302,427 |
| Germany and Luxemburg | 2,147,641 | 4,397,504 | 15.21 | 17.64 | 2,239,863 |
| France | 1,417,072 | 1,722,450 | 10.04 | 06.93 | 305,408 |
| Belgium | 493,544 | 847,000 | 03.50 | 03.41 | 353,456 |
| Austria and Hungary | 434,259 | 761,606 | 03.08 | 03.06 | 347,356 |
| Russia | 409,633 | 532,649 | 02.90 | 02.14 | 123,016 |
| Sweden | 333,496 | 457,052 | 02.36 | 01.84 | 123,556 |
| Spain | 60,000 | 200,000 | 00.42 | 00.80 | 140,000 |
| Italy | 20,000 | 12,265 | 00.14 | 00.05 | ..... |
| Other countries | 120,000 | 100,000 | 00.85 | 00.40 | ..... |
| Total | 14,117,902 | 24,869,534 | 100.00 | 100.00 | 10,779,367 |
| Italy diminished | ..... | ..... | ..... | ..... | 7,735 |
| Other countries diminished | ..... | ..... | ..... | ..... | 20,000 |
| | | | | | 10,751,632 |

This table shows that Great Britain's production of pig iron has decreased in the last eleven years from 45.20 to 33.16 per cent. of the total product, while that of the United States has increased from 16.30 to 30.57 per cent., and that of Germany from 15.21 to 17.64 per cent.

The aggregate production falls a very little short of 28,000,000 net tons of 2,000 pounds each. In round figures the United States, Great Britain, France, Germany and Belgium produced over 90 per cent. of the registered production of pig iron of the world; all other countries less than 10 per cent.

Since the foregoing table was compiled the production of iron in the United States has been declared for the census year ending June 30, 1890, in tons of 2,000 pounds each, to be 9,579,779 tons.

The production of the last half of the census year, coupled with the output since, indicates a production in the calendar year 1890 of over 10,000,000 net tons, thus placing the United States at the head of the column, and in some measure justifying the forecast given in this treatise, of which the first draft was prepared several months since.

If the law of accelerating demand is sustained by the subsequent analysis and the supply of the year 1900 must be fifty to sixty million tons, then the normal increase in the product of the United States must of necessity be at the average rate of about two million tons a year from the end of the year 1889 to the end of the present century. That would call for a production in the United States of only fifty to sixty per cent. of the probable supply and demand.

It rests with the representatives of the iron industry of the other countries to prove how they could increase their present product so as to meet the supply which may be called for from them without such an increase in the cost of iron as to cause almost an industrial revolution in all the present conditions.

Reference has been made to the address given by Mr. Abram S. Hewitt, which he has kindly permitted me to make use of, and which I had never seen when I framed the inquiry on which this treatise is now based.

I will incorporate from time to time some extracts from this address in order to show how the logic of the case has guided both the iron master and the student of statistics to the same conclusions in a work of investigation undertaken by the one in 1856 and by the other in 1890.

The extracts from Mr. Hewitt's pamphlet will be given in different type so as not to be mistaken for my own text or to affect the continuity of my own treatise; if not thus distinguished, the treatise of 1856 might be taken as a part of the treatise of 1890. I venture to copy from this treatise of Mr. Hewitt's, since I may call upon him as a witness that I am not a plagiarist.

Referring to the product of iron in 1855 in his address given in February, 1856, Mr. Hewitt says:

"I am inclined to believe that the production for 1855 did not materially exceed the figures for 1854. Even the British Lion pauses to take breath, but it is rather from the difficulty of providing materials on short notice than from any unwillingness to supply the world with all the iron which is wanted for its annual consumption. I shall now endeavor to ascertain what that amount is by successively stating the make of other European countries, as nearly as I can ascertain the same:

| Date. | Tons. |
|--------------------------------|------------------------------------|
| England | 1855. 3,585,906 |
| France | 1845. 436,900 tons estimated. |
| Belgium | 1855. 255,000 |
| Russia | 1849-1851. 191,402 tons estimated. |
| Sweden | 1850-1852. 124,169 ". |
| Norway | 1855. 22,500 |
| Austria | 1847. 200,000 |
| Prussia | 1855. 400,000 |
| Balance of Germany | 210,000 |
| Elba and Italy | 72,000 |
| Spain | 27,000 |
| Denmark, and balance of Europe | 20,000 |
| United States | 1,000,000 |
| | 6,889,406 |

"The present annual production of the world does not, therefore, exceed 7,000,000 tons, of which Great Britain produces rather more than one-half."

CONSUMPTION.

In the conversion of iron into steel, or Bessemer metal, the United States now take the lead; but in the conversion of both iron and steel into higher and finer forms, Great Britain still asserts her supremacy. Out of 8,250,000 gross tons of pig iron produced in 1889, Great Britain converted 6,050,000 tons into higher forms. This is at the rate of 360 pounds per capita, but much of this advanced product was exported.

In the final use of iron and steel, the people of the United States now lead all other countries in their per capita consumption.*

In one form or another the United States consumed substantially their whole domestic product, and nearly one million tons in addition thereto which were imported in the form of rails, bars, tin plates, machinery or something else. The people of the United States, probably numbering about 64,000,000 in the year 1889, consumed over 300 pounds of iron per head. This estimate is reached by adding imports to and deducting exports from the domestic consumption, the total consumption having been 8,427,593 gross tons.

Great Britain, France, Germany and Belgium consumed or put to final use 175 pounds per head. Their population, numbering in round figures 136,000,000, made use of 10,577,389 tons. The rest of the world, of which the population may be computed at about 1,200,000,000, consumed only eleven to twelve pounds of iron per head, the aggregate amounting to 5,864,562 tons. Total production accounted for, 24,869,534 gross tons.

It has been remarked that the control of the great iron and coal deposits of the world has fallen mainly to the Teutonic races and not to the Latin races; this advantage has given the English and the Germans the supremacy in commerce, in which the people of the United States have thus far failed to share in the full measure to which

*Since this was written the United States have taken the first place in the production of iron.

they are entitled, perhaps because of their obstructive legislation, and partly because of the influences which preceded and grew out of the civil war.

I am well aware that in dealing with the computed population of the whole globe there may be a margin of error; but this error does not really affect the general conclusion to which I wish to lead. In order that any reasonable allowance may be made for the margin of error, the case may be put hypothetically. If the population of the globe in 1889 numbered 1,400,000,000, then the average consumption of the iron which entered into commercial statement of the great iron-producing countries did not exceed forty pounds per capita. If the population of the globe in 1878 numbered 1,250,000,000, then the consumption of iron in that year did not exceed per capita twenty-seven pounds (in 1856 Mr. Hewitt estimated it at seventeen pounds). If the population of the globe in 1878 approximated more nearly to that of 1889, then the per capita consumption of iron in that year may not have exceeded twenty-five pounds. To these figures must of course be added the small crude production of iron in Asia and in Africa, which is not included in any commercial estimate, but is consumed where it is made.

SUMMARY OF CONSUMPTION.

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| In 1870 to 1878, inclusive, the average consumption of iron per capita by the people of the United States, as nearly as it can be computed, did not exceed..... | 150 pounds. |
| In 1879, taken separately, it may have been approximately..... | 200 " |
| In 1880, it was in excess of..... | 300 " |
| In 1889, after making allowance for the relative import and export of each country, did not exceed per capita..... | 175 " |
| If there were upon the globe, in 1889, about 1,200,000,000 people, aside from the population of the foregoing countries, then their average consumption of iron did not exceed per capita..... | 11 to 12 pounds. |

SUMMARY IN ROUND FIGURES AND GROSS TONS—1889.

| | Population. | Per Capita. | Tons. |
|--------------------------------------------|---------------|-------------|------------|
| United States | 64,000,000 | 300 pounds. | 8,500,000 |
| Great Britain, France, Germany and Belgium | 136,000,000 | 175 " | 10,500,000 |
| All the rest | 1,200,000,000 | 11 " | 6,000,000 |
| Total | 1,400,000,000 | 40 pounds. | 25,000,000 |

The data of consumption are given by Mr. Hewitt in 1856 in the following terms:

"Assuming the population of the world to be 600,000,000, the production, and, of course, the consumption, is at the rate of about 17 pounds per head.

"In 1740, when we have the most reliable data, the consumption of iron did not amount to one pound per head. But the great fact to which I wish to call your attention, in order to produce the practical results at which this paper aims, is the distribution of the present consumption among the nations of the world. In order to determine this point I have made very careful calculations, which show the following result:

| Nations. | Production per head. | Consumption per head. |
|--------------------------------------------------|----------------------|-----------------------|
| England | 175 pounds | 144 pounds |
| United States | 84 " | 117 " |
| France | 40 " | 60 " |
| Sweden and Norway | 92 " | 30 " |
| Belgium | 136 " | 70 " |
| Austria | 12 1/2 " | 15 " |
| Russia | 10 " | 10 " |
| Switzerland | ..... | 22 " |
| Prussia | 50 " | 50 " |
| Germany, Zoll Verein | 50 " | 50 " |
| Spain | 4 1/2 " | 5 " |
| Turkey and the uncivilized portions of the world | ..... | to be calculated. |

"A careful examination of this table will demonstrate conclusively that the consumption of iron is a social barometer by which to estimate the relative height of civilization among nations; for, considering in what practical civilization consists (I exclude aesthetic civilization from this species of estimate), measuring by the actual comforts and conveniences with which social life is surrounded, what philosophic traveler or student will not classify the nations of the world precisely as the table arranges them: England first, United States second, Belgium third, France fourth, Germany fifth, Switzerland and Sweden about on a par, Austria next, then Russia, Spain and Turkey, and the great outlying regions of barbarism?

"You will not fail to observe another fact, that the large consumers are large producers in every case—a fact which a little familiarity with the laws of trade and industry will show to be inevitable."

CONCLUSION.

We may now venture to forecast the future on the basis of our past experience.

The conversion of iron into railways and steamships, the opening of commerce and the development of industry in specific countries, coupled with the increase of commerce between countries which are now connected by railway and steamship more intimately than ever before, while creating an enormous primary demand for iron and steel in laying the railways and building the ships, yet develops a constantly increasing secondary demand for iron and steel for other uses, such as for structural purposes, for engines, machinery and for tools of every name and nature. Thus it happens that while the development of the ways of commerce has, at the beginning, created an enormous demand for iron and steel, subject to considerable fluctuation according to the activity or depression in constructing railways and vessels, yet, in the last two years in which the construction of railways has been lessening in ratio to the immediately preceding period, especially in the United States, the increase of the demand for iron for other purposes has more than counterbalanced the diminishing demand for that purpose, and the advancing tendency of prices on what may be called the normal demand of the world has been developed.

Let us then put questions in regard to the future status of each of the great sections of the world treated in the above table. Who will answer them?

In respect to the United States, is it not almost certain that the consumption of iron will go on increasing in the period which will elapse between 1890 and 1900—not only in ratio to the population, but also in a measure corresponding to the increase per capita which was developed between 1877 and 1889? Let it, however, be assumed that the increase per capita will only rise from 300 to 400 pounds per head; then the 60,000,000 of people who will occupy this country in the year 1900 may require our present supply, and in addition thereto, 7,000,000 gross tons.

If the demand of Great Britain, France, Germany and Belgium shall increase only 20 per cent. in the next ten years, that increase will create a demand in addition to their present consumption for 2,000,000 tons.

If the consumption of the rest of Europe, of Asia, of Africa, of South and Central America, and of Australia shall only carry their demand from eleven or twelve pounds per capita to twenty-two or twenty-four pounds, then, in addition to their present supply of 6,000,000 tons, they would require 6,000,000 more.

A summary of these conclusions will make the prospective demand of the world in the year 1900 stand as follows:

| | |
|-------------------------------------------------------|------------------|
| Present production..... | 25,000,000 tons. |
| Increased consumption in the United States..... | 7,000,000 |
| " " " Great Britain, France, Germany and Belgium..... | 8,000,000 |
| " " " all the rest of the world..... | 6,000,000 |

Total increase of demand..... 15,000,000

Total supply required..... 40,000,000 tons.

In 1889 the demand for iron was 76 per cent. greater than in 1878. The average price of No. 1 anthracite foundry iron in Philadelphia in 1878 was \$17 1/2 per ton. In 1889 it was \$17 3/4 per ton. Is there not reason to expect the increase in the demand of

Asia, Africa, South and Central America, and Australia, has just begun. In them are supposed to dwell about 1,000,000,000 people.

These are suggestive conditions. Each one may apply his own reasoning to their application to the specific branches of industry in which he may be engaged, especially those who are engaged in the production of coal and iron in the Southern States, in which section, the development of the mines having only just begun, the margin for reduction in the cost of iron remains quite large.

At the end of 1880 the railway mileage of the United States was, in round figures, 94,000.

In 1881 the writer ventured to predict that, even to make an approach to an adequate service, the mileage must be increased by 117,000 before the year 1900, or perhaps in fifteen years at the computed rate of construction in 1880, when about 7,600 miles were constructed. Since then we have added over 8,000 miles a year on the average, and we shall doubtless reach the 210,000 miles required some time in advance of the date set by me.

No one has yet computed the average requirement of a mile of electric railway and its equipment, but it is manifest that the demand for iron and copper for such use will be an element of the greatest importance in the problem of iron supply now presented.

The area of every large city must be enlarged, and the population now crowded into narrow streets under bad conditions must be distributed by the service of the electric railway; vast areas of the surrounding land in the neighborhood of great cities heretofore almost useless on account of the steep grades required to reach it will now be put to use—thus substituting the wholesome conditions of life upon high land for the crowded conditions of the valleys and the low lands. All the new forces now coming unto us are tending to do away with the excessive concentration in cities by distribution in the more open suburbs.

Every town or city of 5,000 people or more will soon demand an electric railway.

The standard of adequate steam railway is one linear mile of rail to each four square miles of area, in Massachusetts. How many miles of electric railway branches will be needed to connect these lines which are in the low lands and valleys with the high lands and hill-tops of the State?

If the standard of a sterile area is at this measure, what will be the standard of the valleys and hills of the Piedmont and Cumberland plateaus which flank the great mountain chain in which the "imperial deposits" of iron and of coal have been placed at the disposal of the people of this country? Who will venture to forecast the future even of the Southern Appalachian chain and the plateaus on the flanks bordered by a fertile upland country on either side?

When this great section of heavily timbered mountain ranges and broad, high valleys sometimes called "The Land of the Sky," which had been kept from view by the surrounding pall of slavery, first began to be opened, the writer ventured to describe it with the Cumberland and Piedmont plateaus on either flank and the high uplands of Georgia and Alabama on the south, as comprising "an area nearly as large as France and twice the area of Great Britain, containing a potential in agriculture equal to either and minerals and timber equal to both combined." It is to that section that attention will be mainly directed by this treatise. It may become the center of the principal iron production of the world. By whom and in what manner will it be developed?

If one may reason by analogy from the exhaustive reports of the pig iron production given in the census of 1880 by Messrs. James M. Swank, Joseph D. Weeks, Raphael Pampelly and other experts, it then required substantially 100,000 men and boys to produce 4,000,000 tons of pig iron in the relatively less advantageous positions and in the smaller and less effective furnaces of that date. This force was divided as follows:

| | |
|----------------------------------------------------------------------------------|---------|
| Proportion of coal miners occupied in mining coal for use in blast furnaces..... | 18,983 |
| Occupied in mining iron ore..... | 31,668 |
| Occupied in blast furnaces..... | 41,875 |
| | |
| Listed in detail..... | 92,526 |
| Coke ovens and miscellaneous, say..... | 7,474 |
| | |
| Total..... | 100,000 |

According to these data the average product per man was 40 tons per year, but the work was not constant. It was computed to cover about three-quarters of the year, or say 274 days out of 365. A full product of a force of 100,000 would have been over 5,000,000 tons—fifty tons per man, or seven days' work to each ton including Sundays, or six working days.

The following prospect may be extended to those who choose to put capital and skill into this work in the Southern iron section:

"We can promise a yield of at least sixty tons per man for each year's work, at five working days to each ton, or less. Each million tons which we are called upon to add to our present product will therefore require the work of about 17,000 men."

"The colored man has already proved his capacity to do the greater part of this work, two-thirds of which is that of the common rather than of the specially skilled laborer, in the most effective way."

"The colored population of the South, now numbering six or seven million, now increases at the rate of about 200,000 a year. In each year at least 40,000 adult black laborers are added to our force. Less than one-half that number would more than suffice to do all the work required in the production of 1,000,000 tons of iron. We might require 2,000 men of special skill and aptitude. We can pay twice the wages now prevailing in Germany, France or Belgium, and considerably higher wages than those prevailing in England and Scotland, and yet, owing to our more favorable conditions, we may produce our iron at the same or at a lower cost."

"As an inducement to skilled workmen to join in this undertaking, we offer excellent conditions of life, abundance of land, exemption from military service and a great future for their children. Our iron ores are mostly quarried upon the surface; our coal lies mostly above the drainage level; our coal and limestone and ore are in close proximity to each other in a healthy climate, surrounded by a most fertile soil."

It will be observed that the force which is required to produce a million tons of pig iron is relatively small as compared to the great army of workmen to whom iron and steel are the materials of chief importance in all branches of industry.

When the disparity or disadvantage in the price of iron is removed, and the cost of iron to consumers is practically the same in the United States and in Europe, the stimulus which will be given to the conversion of iron and steel into their higher or finished forms in this country may hardly be conceived.

When dealing with this branch of the subject in 1856, Mr. Hewitt defined the conditions necessary to the production of iron in sufficient measure to meet the prospective demand, in the following terms:

"View the subject, then, as we may, whether by the history of the production of iron for the last

100 years, or by considering the consumption per head and the progress of civilization, applying only the law which we find at work, and which no social Joshua has power to arrest, we are brought to the conclusion that, great as is the present production of iron, it is but in its infancy, and that the very smallest amount which will answer the purposes of the civilized world 100 years hence will be 100,000,000 tons per annum. How and where, geographically considered, is this enormous quantity, or the half of it, or the quarter of it, to be made?

"In order to solve this problem, it is necessary to consider what are the elementary conditions essential to a large production of iron. These are—

"First. An adequate supply of the requisite raw materials, ore, limestone and mineral coal, for charcoal can only be used, as we have seen, to an insignificant extent.

"Second. These raw materials must be geographically so situated as to be brought cheaply together, for the value of raw material does not more consist in what it is, than in where it is—a fact too much overlooked in the mining projects of the day.

"Third. There must be cheap means of transport to market.

"Fourth. There must be sufficient density of population to insure labor at a moderate cost.

"Fifth. There must be adequate capital to build and carry on the works.

"Sixth. There must be the skill to manage them in the most economical manner.

"Seventh. There must be indomitable energy and strict integrity in the management; that is to say, the iron business can only exist on a large scale where the people are essentially industrious, intelligent, energetic and honest."

One of the purposes of my missive of inquiry has been to ascertain what relation the wages or earnings of the iron and coal miners and workmen in the blast furnaces might bear to the cost of labor in the ton of iron or ingot of steel. Since then the publication of Commissioner Wright's report has superseded any computations that I might have made.

Evidence of vast and easily worked mines of coal and ore suitable for every branch of iron or steel making have been secured both from the maritime and the central provinces of Canada.

A great many returns have been made which go far to prove that it will not long be necessary to move iron ores over long distances in this country or to import high-grade ores low in phosphorus from other countries. The evidence seems to be adequate to prove that there are vast deposits of suitable ores for every kind of steel among the crystalline rocks of the Appalachian chain. Others must verify these statements; I give in the appendix but one in connection with this treatise.

If such are the figures, and if within the very heart of the "Land of the Sky" these great deposits of ore and coal have been reserved for our use, then it follows that the United States must serve the world with a constantly increasing proportion of the iron and steel which will be required.

If it be true that there are places at which the materials can be assembled for making a ton of Bessemer metal suitable for conversion at a cost of a dollar to a dollar and a-half per ton of metal, and if these materials can be converted at such points at a total cost of little more than ten dollars per ton of metal, covering all charges for transportation of material, labor, repairs, depreciation, insurance, taxes and general expenses of administration, then at that point may be the center of the chief production of iron and steel in the near future.

One may not venture yet to name the specific place or places. The survival of the fittest among the many enterprises now claiming public attention will soon determine it in the emulation between the North, the South and the West.

Suffice it that if one should stand upon the top of the highest peak among the Great Smoky mountains in the heart of the Southern Appalachian chain, and could bring within his vision all that would come within a radius of seventy-five to a hundred miles, he might be able to establish the center of iron and steel production which would not be far away from what has been called the "center of gravity" of the population of this country.

If he could then bring within his vision the whole configuration of the area enclosed within a circle of about one hundred and fifty miles in diameter, centering on the Great Smoky mountains, he might trace the lines made by the erosion of the rivers and the gaps in the ranges on which the rails may be laid to the northwest at the southern border of Ohio, and to the southeast on the way toward the Atlantic ports of South Carolina, over which the metal produced at the possible future center of the iron production of this country may be distributed on the easiest grades either for domestic consumption or for the supply of foreign markets.

IRON, FOOD AND WAGES.

There are probably no persons more aware of the "total depravity" of figures and their faculty of making the worse appear the better reason than those who have given most attention to the compilation of statistics. To the student of social science figures and statistics are mere rubbish, unless their true meaning can be wrested from them. As a basis for sound, economic reasoning they are essential, but must be judiciously treated.

In this treatise the writer has attempted to sort the figures of the iron industry in their true relation, and to derive from them the true direction which should be given to the policy advocated by those who desire to promote the most complete development of this great branch of industry in the United States. Many may differ with the writer in his deductions, who may yet value the figures which have been compiled, sorted and stated in the most impartial manner of which the writer is capable.

To the student of general social science, the study of the iron question is one of paramount importance. In this connection the writer may be permitted to repeat some statements which he has made elsewhere, on the dependence of nations for their food supply upon the low cost of transportation by railway and steamship.

The food question lies at the foundation of the wage question. The iron problem underlies the food question.

In the study of the rate of wages in its connection with the food supply two general statements may be permitted:

1st. In all the arts which are above the grade of mere manual labor unaided by modern science, tools or mechanism, the rate of wages will be found to be in inverse proportion to the cost of labor, very low where the cost may be very high, and conversely the lowest cost of labor will be found to be the correlative of the highest rates of wages that can be derived from the conduct of each special branch of industry. The exceptions to this rule will be found in those specific occupations of which the free exchange of the product among nations has been obstructed by the taxation of imports in this and in other countries.

2d. An abundant supply of food is the prime factor in low cost of production from which high rates of wages may be derived. Without a full and adequate supply of food the workman cannot do effective work, and will, therefore, derive low rates of wages or small compensation from the product on which he exerts his energy, impaired, as it must be, for lack of adequate nutrition.

The cost of food is one-half the price of life or more to the whole body of workmen

in this and in every other country; that is to say, more than one-half the income or more than one-half the effort to sustain life is devoted to securing a supply of food by the vast majority of the people of every country and clime.

If regard be given to the rates of wages which are now earned in the several countries of the world that are called civilized, it will be observed that in proportion to the abundance or scarcity of food and to the ease or difficulty of obtaining it is the rate of wages greater or less?

Which is cause and which is effect?

It matters not how the abundance of food may be obtained, whether by production or by exchange. Let any one trace the condition and measure of the food supply, and he will find that the rate of wages corresponds thereto as he glances over the industrial statistics of the several countries of the world that are called civilized. In a general way the conditions of food and wages, beginning in abundance and ending in scarcity, would follow the subsequent list:

- 1st. The United States.
- 2d. England, Scotland and perhaps the north of Ireland or lesser part of Ireland.
- 3d. Holland.
- 4th. France.
- 5th. The larger part of Germany.
- 6th. Belgium.
- 7th. Spain, Austria, Italy and the greater part of Ireland.
- 8th. Russia and Eastern Europe.

The treatment of this subject and the analysis which would be required to show the relation of cause and effect in the matter of the food supply and its relation to rates of wages would be out of place in this treatise. This reference is made to it because iron and steel are the prime factors in the distribution of food.

Disregarding fractions, one may rate five pounds of wheat to the quartan or four-pound loaf of bread, which is the mainstay of the British workman and his family. In the year 1889 the cost of moving five pounds of wheat from the great plains of Dakota to Great Britain, a distance of about five thousand miles, was less than a half-penny, or less than one cent.

Again, in the recent demonstration of the American workmen on Labor Day, some part of which was devoted here and there to speeches denouncing the alleged oppression of the great railway corporations which move our crops, thousands of men enjoyed a holiday which they could well afford to spare from their work in order to devote it to intelligent methods of improving their condition. One reason why workmen can enjoy more leisure at the present time than ever before is because by the application of capital, skill and intelligence to laying the ways of steel by which the more sterile sections of the eastern part of the United States have been bound or brought close to the fertile regions of the West, is this—it requires but the measure of a single day's wages of an average workman to pay the cost of moving a year's supply of all the food which can be moved from these distant sources one thousand miles or more. The beneficent function of the great railway magnates to whose energy these great railway enterprises have been due, has led to these conditions, in which a greater amount of leisure might be devoted, according to the best definition of the word which I have ever seen, "to the intelligent and diligent use of the time which may be spared from work."

The great body of the workmen who took their places in the procession on Labor Day were skilled mechanics and artisans. Each of them probably sustained two other persons, a group of three being the average sustained by each workman, including himself. In very many cases they were doubtless heads of the average families of five persons each. If we then fairly assume that each man devoted to this holiday a day's work worth two or three dollars, and spent as much more for uniforms, badges, bands and the other elements which enter into the cost of such a display, then it follows that they could well spare the sum of five or six dollars each. That sum would now pay the cost of moving by rail and canal a ton of food over a distance of more than one thousand miles. Assuming that each one of the skilled mechanics who took part in that display may have been responsible for the food supply of himself and his family, equal in their consuming power to four adults, the price of the holiday represents a sum which would now pay the freight of three barrels of flour weighing substantially six hundred pounds, one thousand pounds of meat and four hundred pounds of dairy products, a ton in all, over a distance of one thousand miles or more. That quantity of the food which can be brought from far distant places, coupled with the more perishable articles of food which must be produced near the dwelling-place, is a large and even wasteful supply of an average family of five or six persons for the period of one year.

Neither the railway system nor the labor system of this country are yet fully perfected. There are abuses on both sides which may be remedied only by time and patience, by evolution rather than by revolution; yet it is essential to the true remedy that the facts should be known.

The function of the writer in dealing with these questions has been to test the hypotheses of the deductive school of political economists—the crude suggestions of those who have been named the economists of the chair who have but little practical experience in life—and the well meant but wholly mischievous conceptions of many of the so-called labor reformers, by bringing them to the test of facts in order that social fallacies, many of which are dangerous in their application, may be exposed by the light of experience.

Finally it may be remarked that it is not only a matter of the utmost personal interest, but perhaps the duty of every man who has attained a little public influence, to use it in such a way as to hasten the time when the English-speaking people of every land and of every clime may be united in one great "Zollverein" or treaty for the free exchange of their services among themselves if not with others. They may then dominate the world in the pursuits of peace and plenty, and may compel other States and nations to disarm which are still bound to the misconception that belonged to the childhood of nations, that commerce is itself a state of war, and that it promotes antagonism. This medieval theory of trade is still a mark of the mediocrity of intelligence and lack of true political education which is displayed by legislators, who even now propose to regulate general prices and "to raise the rate of wages" by act of Congress—a proposition actually made by a Senator in a debate but a few weeks since!

Under such a treaty of mutual service the control of the commerce of the world would be so complete on the part of the English-speaking people that other nations would be incapable of bearing the load of their great armies, and would be compelled to disband them and to permit their navies to rust away in order that they might live. The antagonism of European nations is now maintained only to keep up the barriers to commerce, at which the taxes, amounting to over \$600,000,000 a year, collected from

the scanty earnings of the people, yet come to less than the cost of maintaining the armies and navies which, except for those barriers, would not be required. Such are the systems behind which bureaucratic, dynastic and autocratic power is maintained at the cost of the oppressed.

Nothing could be more conducive to this result than the general conviction to which the representatives of the iron and steel interest of this country are rapidly coming, that their work is one of necessity and not of choice, and that it no longer requires, if it ever did, the artificial stimulus which has been given to it by means of duties upon the import of coal, ore and crude metal into this country.

If all duties upon the imports of ore and coal were now removed, pending the development of the new sources of supply, a great many existing iron furnaces and iron works or machine shops would be saved which are now being stopped and dismantled, especially heavy iron works in New England. Time would be given for the increased demand which will soon require the entire product, not only of the United States, but of the North American Continent and Cuba, to be met in a safe and suitable manner, even if it increases from ten to thirty million tons or more before the next century.

If the forecast presented in this paper is a true one, every existing plant will be called into requisition in the near future that has even the shadow of a right to exist. It is probable that the iron mines of the United States cannot be developed with sufficient rapidity to meet this demand, but that the iron furnaces, works, mills and machine shops on the eastern coast must be sustained by temporary if not permanent supplies of ore and coal from Canada and from Cuba.

The writer, therefore, begs that this treatise may be carefully and impartially considered and weighed on the facts which he has supplied, to the end that American labor may be protected by the exemption of its necessary materials from unnecessary taxation, and that domestic industry may be promoted to the utmost by relief from a policy which now inflicts privation under the name and guise of protection.

APPENDIX.

As this monograph is wholly a compilation of data supplied by others, it is incumbent on the writer to submit the evidence on which it is based. Only one statement has been selected for publication which bears testimony to the existence of large deposits in the southern part of the Appalachian chain of high-grade ores suitable for making steel. This paper has been submitted to the writer with maps showing the physical characteristics of this portion of the Appalachian chain in the neighborhood of the Great Smoky mountains, where among the crystalline rocks the kind of ores now said to have been found in great quantity might rightly have been sought, in view of the long-known deposit named the "Cranberry" ore somewhat further north, and also in view of the geologic relation of this formation to those in which the red fossiliferous and brown hematite ores exist in such abundance on the flanks and to the south of the central chain. Doubtless the attention of the visiting members of the British Iron and Steel Institute will be called to these deposits when they turn their attention to the iron resources of the South. In view of the doubts which have previously existed as to the ores suitable for steel in the Southern States, their verification of these and other claims will be looked for with the greatest interest.

I.

REPORT OF MESSRS. GEORGE B. COWLAM AND GOLDSMITH B. WEST.

KNOXVILLE, TENN., September 8, 1890.

MR. EDWARD ATKINSON, Boston, Mass.:

Dear Sir—Referring to our recent conversation with you in Boston concerning the resources of the Southern Appalachian region, especially its stores of coal and of iron ores, and the conditions favoring or obstructing the economical manufacture of iron and steel in the Southern States of our Union, and to your request that we would put in writing, for such public use as you might desire to make of it, the substance of our verbal statement:

We have both been engaged, as have others associated with us, for many years in examining personally and with the aid of many skilled experts, the natural resources of the mountain country which occupies the central portion of the Southern States east of the Mississippi river; in finding out at first hand and from the ground itself what was in it and upon it; in studying the topography of the country through railway surveys and reconnaissances carried on by ourselves and others associated with us during the past six years, aided by like work done by many others throughout the Southern mountain country during the past twenty-four years, covering an examination of the great mountain chains and ranges and the valley ridges which separate, and the water-courses, mountain passes and mountain water-gaps which unite by short haul and easy grades for railways these interdependent resources lying in parallel strips throughout this region from end to end; in a word, in studying the natural laws, based upon natural facts, which govern and control the development of the country, in order that we might know with certainty along what lines and at what points its wealth could best be concentrated for manufacture and distribution, and where labor could be most profitably employed and most economically and comfortably sustained.

This work has been carried on as a private business enterprise, for the purpose of locating and securing such properties as seemed most likely to be easily and profitably developed. It has been thorough and systematic, involving an examination of titles (often very complicated), as well as resources and their accessibility, foundation work for the investment of capital.

Of course the great fundamental resources of coal and iron have absorbed the larger portion of our expenditure of time, labor and money. Confining this statement to such things as our work has made known to us at first hand, we will try and give you, in as few words as possible, a clear statement of what we have found about iron and coal. Permit us to say here that while we recognize the fact that the Southern Appalachian region by no means covers all the coal and iron resources of the Southern States, yet it has been almost wholly the field of our investigations, because we found that, aside from containing the great bulk of these minerals of the best quality, it held them in closer proximity and with attendant conditions for working them up more favorable than elsewhere exists.

THE SOUTHERN APPALACHIAN REGION

Embraces a strip of elevated mountainous country seven hundred miles long, with an average width of one hundred and fifty miles, lying in a northeast and southwest course diagonally across a square formed by the 34th and 40th parallel north of the equator and the 77th and 87th meridians west of Greenwich, extending from the Pennsylvania line southwestwardly through Maryland, the Virginias, Kentucky, Tennessee and the Carolinas into Alabama and Georgia.

It is divisible into three strips, parallel with its side lines and of substantially equal areas.

The northwestern strip, from Pennsylvania to Alabama, varying in width from more than one hundred to less than thirty miles and averaging over fifty miles wide, is an unbroken coal field, containing upwards of 39,000 square miles, is a combination of mountain and plateau with an average elevation of two thousand feet above sea level, and is cut through by two streams, New river in West Virginia and the Tennessee river in Alabama. It contains generally from two to five workable seams, mostly above drainage and with only such slight variation from horizontal beds as serves to make mines self-draining. In portions of West Virginia, Virginia, Kentucky and Tennessee the measures are very thick and the seams numerous and large. In a portion of the Tennessee field north of Knoxville there are sixteen seams above drainage, nine of which are three and a half feet thick or upwards, with three very valuable workable seams in the next three hundred feet of underlying measures. In the States above named the seams frequently attain six or eight feet in thickness and in exceptional cases ten, twelve and fourteen feet of solid coal. This comprises every variety of bituminous coals of the highest standard of excellence, high in carbon and notably free from sulphur-

black coals of the best shipping qualities, unexcelled for steam or grate, splint coals of the best, cannel coals, some of which will compare favorably with the celebrated "Yorkshire cannel," coking coal of the highest standard throughout the length of the coal field. Comparatively speaking, this Southern Appalachian coal field contains forty times the amount of coal, accessible to economical production and distribution, contained in the coal field of Great Britain before a pick was struck in the ground. The coal field as a whole, is heavily timbered with virgin forests of white, red, black, Spanish, chestnut and post oaks, yellow poplar, white and yellow pine, hickory, chestnut and other valuable woods. Its soil of sandy loam produces good crops of grass and small grain, and is especially productive of fine fruit and vegetable crops, and enriched by lime or phosphates or by grass crops turned under becomes very fertile farming land. Its bracing, dry air and pleasant temperature give the region very remarkable exemption from fevers and pulmonary diseases, and its frequent summer rains, brought about by its elevation, save its soil from summer drought. All the natural conditions are favorable for economical mining and cheap and comfortable living.

Along the southeastern side of the coal field strip lies the valley strip of nearly equal area. Its northwestern border, lying a thousand feet below, and at the southeastern foot of the coal field, is a broad belt of persistent and very heavy seams of fossil iron ores of the Clinton measures, and in some places these ores are brought up, by synclinal folds, into the coal field itself, notably in Sequatchie valley, in Tennessee, along the north side of Pine mountain, in Kentucky, and at other points. This ore, upon which the iron interests of Birmingham, Ala., and other Southern iron districts are mainly founded, is too well known to need any extended notice. It runs something over 40 per cent. in metallic iron, rather high in silica and in phosphorus, contains considerable lime and is best calculated for foundry iron. But it is very cheaply mined and works very easily in the blast furnace. The southeastern rim of the valley strip is another broad belt of hydrated ores, brown hematites or limonites, running upwards of 30 per cent. in metallic iron, 5 to 8 per cent. in silica, about 3 to 1 per cent. in phosphorus, some lime and alumina, sometimes manganiferous, and producing the best quality of mill iron noted for toughness and ductility. This belt of ores our examinations have shown to approximate very closely in quantity and persistency to the fossil ores from Pennsylvania to Alabama and Georgia. They follow the Lower Silurian measures.

Southwest of the valley strip, parallel with it, of nearly equal area, lies the mountain strip, made up of the great mountain chains of the South, the highest ranges east of the Rocky mountains, and embracing all the formations from the lower measures of the Lower Silurian down to the oldest of the crystalline rocks. Throughout this strip, from Maryland through Virginia, North Carolina and South Carolina and into Georgia, our examinations have traced large beds of very high grade iron ores, mainly magnetites, more rarely specular ores and sometimes brown ores. The magnetites range from 50 per cent. up to as high as 69 per cent. metallic iron, very low in silica, ranging from 3 per cent. up to 5 or 6 per cent., and in the ores of lower percentage from 1 to 7 per cent. of metallic manganese. Bessemer ores always, the phosphorus ranging generally from 0.003 to 0.008, and not running anywhere above 0.025 and free from sulphur.

We have traced from two to as high as seven different leads, large enough to be profitably worked, in different portions of this strip; in Maryland two, in West Virginia two, and in Southwestern Virginia three, one of them highly titaniferous, but the others entirely free from titanium; in North Carolina from four to seven, one double lead which at one point our examination shows to consist of a thirty-foot lead separated from another of forty feet by thirty feet of silicious sinter, at other points leads varying from eight to twenty feet and upwards, at other points from four to eight and ten feet and so on, free from titanium, with but four to six thousandths of one per cent. of phosphorus, lying high above water level and in position for very economical mining. We are able to say, from personal knowledge, that the quantity and quality of the Bessemer ores of the Southern Appalachian region is, beyond all question, sufficient to meet present and prospective demand for many generations. It is a question of accessibility to the railway lines and of the construction of railways to permit their development, and not a question of quantity or quality. And this want of railway transportation applies largely to the fossil and brown ore belts as well as to the magnetites. Nor is it a matter involving large and extravagant outlay to reach these ore belts and connect them all with coal. In this respect nature has been more than generous to the Southern Appalachian region. The peculiarity of our Southern railway system, laid in times when the mining of coal and the making of iron was little thought of, is that it consists mainly of a line east of the eastern range of mountains, another lengthwise through the middle of the great central valley strip, and another west of the coal field. Here and there a branch has been run into the coal field from one side or the other and new lines are now in process of construction to connect the coal field with its nearest iron belt, the fossil ores, but the great lack is of cross lines to connect by shortest haul all these parallel belts with the coal field, true trunk lines connecting not only the coal and iron but nearly all the other minerals used in the arts or in construction, and the great supply of timber with which nature has so richly endowed this magnificent Southern region.

The topography of this region singularly favors its development by a system of cross lines. In the Virginias and Maryland the streams take their rise in the higher western ranges of the coal field and flow eastward through the iron-bearing ranges to the Chesapeake. In the Carolinas and Georgia the streams take their rise in the easternmost of the iron bearing ranges and flow through them to the valley, where they are met by streams flowing eastward from the coal field. Given the quantity and position of these belts of interdependent resources, and it is difficult to see how a skilled engineer could trace on a map lines more advantageous for their concentration and manufacture than the lines which nature has here drawn upon the face of the earth by streams which cut through, from the one side or the other, the mountain ranges or valley ridges which separate them. Not only has she provided grades from the valley lines northward to the coal and southward to the ores but cross lines to connect the region with the Ohio valley and Lake country on the north and west and southward to the Atlantic, can be cheaply built. With this wealth of the South piled up in its central region, with natural outlet northeast to the Chesapeake, southwest to the Gulf, southeast to the Atlantic and northwest to the Lakes, this great natural storehouse and workshop, the Southern Appalachian region, has a foundation for the creation of wealth certainly equal to that of any portion of the world of like area.

Not to trespass too much upon your time and space, we have had to speak generally and briefly of work covering many years over so large an area, but what we have said of Southern resources we know to be true, and the ground is our witness ready to testify at all times that the half has not been told.

We are, sir, very truly yours,

GEO. B. COWLAM,
GOLDSMITH B. WEST.

II.

In order that the continuity of the reasoning upon the future supply and demand for iron and steel might not be interrupted, the conclusions only which I have derived from the several reports upon iron have been given in the text of my treatise. It is proper for me now to cite the authorities on which I have relied in very full measure. I therefore submit extracts and tables derived from the several sources of information to which I am indebted.

Data taken from the address of Josiah T. Smith, Esq., president of the British Iron Trade Association, given at the annual meeting May 7, 1889.

It will be expedient to give very copious extracts from this paper, as it gives the most complete statement of the possibility of meeting the iron ore requirements of the world from any other known source of supply than the United States that has yet been presented. It will, however, be observed that if the statement given herewith of a superabundant supply of ores in the United States, suitable for making Bessemer metal, are verified and sustained, the conclusion which might be drawn from the address only must be wholly set aside.

I have been intrusted with the task of preparing a paper to bring before you this evening on the "Iron Ore Supplies of the World, with Special Reference to the Requirements of Great Britain" * * * * *

DISTRIBUTION OF HOME IRON ORES

No mineral is of such universal occurrence as iron ore, and certainly none is so widely disseminated in our own country. We find it scattered over no fewer than twenty seven counties in England, and it is mined between Cornwall on the one side, and Northumbria on the other. The distribution of the ores, from a geographical point of view, does not, therefore, leave very much to be desired. But there are only six districts where the quantity of ore annually produced approaches or is over one million of tons, and for all practical purposes the home production of ore may be divided into the two categories of hematite and limonite, the former represented by Cumberland and Lancashire, and the latter by Cleveland, Lincolnshire and Northamptonshire. The three latter districts

produce more than 50 per cent., and the former 18 per cent., of all the iron ore raised in the United Kingdom. Of the limonite there is practically an unlimited supply. Of hematite, however, the quantity available is more uncertain, and although it has recently been proved by new discoveries to be more abundant than was at one time supposed, it is doubtful whether the present annual output of about 2½ millions of tons could be largely augmented, or indeed be quite maintained. As it is this description of home ore that is insufficient for our requirements, the sources of external supply becomes not only an important but a pressing question.

IMPORTS OF IRON ORES.

The importation of iron ores into the chief iron-producing countries of the world may be regarded as dating from about the year 1866, when the Bessemer process had been fairly set on foot. In that year, however, the United Kingdom imported little or no ores, the only European countries that then received supplies of foreign ores being France, Germany, Belgium and Austria. The united imports of these four countries amounted to nearly 900,000 tons, or one-seventh part of the quantities now imported into the chief iron making countries from outside sources.

In 1868 the United Kingdom came into the field as an importer of iron ores on a scale of some little importance, receiving 88,770 tons from Spain and 12,073 from Norway, besides smaller quantities from other countries. The total quantity of iron ore imported into the United Kingdom in this year was 114,151 tons, and the home production was 10,169,000 tons, so that the imports were only 1.12 per cent. of the home production.

Up to 1877 the total imports of iron ore into the United Kingdom never, in any single year, exceeded a million tons. In the memorable year 1873 they rose to 967,000 tons, but they fell again for some years afterwards, and the trade was practically limited to a million tons a year, until in 1880 it bounded up suddenly from 1,063,000 to 2,634,000, being an increase of over a million and a-half tons in one twelvemonth. It is somewhat remarkable that this increase should have happened concurrently with the development of the basic process, which was just then coming rather prominently into consideration. In 1882 the imports into Great Britain rose to 3,824,000 tons, which was an advance of nearly two and a-quarter millions of tons on 1879. From this point, however, the movement of the ore import trade was slower until 1887, when the trade took another bound, and the total quantity imported rose from 2,876,000 tons in 1886 to 3,752,000 tons in 1887.

The experience of the United Kingdom has been much the same as that of other great iron-producing countries, excepting Germany, over the period under review. In Germany, as in England, France and Belgium, the iron ore imports increased year by year from 1866 to 1884, when the total quantity imported amounted to 98,442, of which, however, only some 230,000 tons were received from Spain. From 1884 the iron ore resources of Germany have been largely developed, mainly in consequence of the growth of the basic process. This is especially the case with Alsace-Lorraine and Luxembourg, the latter Duchy being classed with Germany, from its connection with the Zollverein. The production of iron ores in Germany in 1887 amounted to 9,351,000 tons, as compared with 5,457,000 tons in 1878, so that there has been an increase of 3,894,000 tons within ten years. The remarkable progress that the basic process has made in Germany, and the proximity of the leading works to large sources of ore supply adapted to that process, justifies the belief that in the immediate future Germany is not likely to call for large requirements elsewhere.

I am afraid I must ask you to bear with me while I put these and similar figures before you. The consideration of this subject naturally divides itself into the two divisions of statistical and technical. About the latter phase of the question I shall have something to say by and bye; but it is precisely because the subject is so essentially statistical and commercial that it has been brought before you this evening through the medium of the Iron Trade Association, and I am satisfied that, however ordinarily unattractive the mere figures may be, their careful study will in this case well repay the student.

BESSEMER ORE RESOURCES OF CONTINENTAL EUROPE.

The only two countries in Europe other than our own that appear to possess any considerable deposits of iron ores adapted for the making of high-class Bessemer iron are Spain and Sweden. Without the ores of these countries our prospects would be worse than they are. Russia has very large deposits of iron ore, especially in the Ural, but these may be dismissed from our consideration, because they are generally remote from the seaboard, and the cost of transporting them to England, under the most favorable circumstances, would be so serious that it would be impossible to use them with success in competition with the cheaper ores of other countries. Cuban ores may also be left out of the calculation, inasmuch as they are becoming scarce, and the total supply now available would not meet our demands for foreign ores for probably more than two or three years. It is possible that additional supplies of ore may hereafter be found in Algeria, but so far as the existing supplies are known, this country is not likely to be of much service to us in the immediate future. We are, therefore, compelled to place our dependence mainly on Spain and Sweden as external sources of supply.

IRON ORE RESOURCES OF SPAIN.

Spain has two districts that are unusually rich in ores of high quality. The first of these is that of Bilbao, of which it is scarcely necessary that I should speak, inasmuch as you all know what it is and what it has done. Up to the present time Bilbao has turned out about forty million tons of ore, in round figures, being, by a somewhat remarkable coincidence, just about the quantity that has been put out from the Lake Superior district, the chief source of the high-class iron ore supplies of the United States. It is a moot-point what quantity of ore remains unworked in the Bilbao district. An estimate made in 1884 put the total quantity of unworked ore in the Somorrostro district at fifty millions of tons, which would be reduced, if it still held good, to less than thirty-five millions of tons, at the present time. But farther inland there are still large almost virgin fields of ore, which are computed to add to this quantity thirty to forty million tons additional. A part of the latter is, however, of doubtful quality. These two regions together would meet the present demand for perhaps twenty years. That, however, although so remote as to get rid of any immediate apprehension of an ore famine, is not a long period in the history of an industry like the iron trade, and if the consumption of ores of this description should increase, there is the prospect of a material reduction of the life of the Bilbao ores. When the time comes that we have to look for ores farther inland, and require to use ores of inferior quality, the time will also have arrived when we must count upon a permanent increase in the cost of producing pig iron, and this is a prospect that we cannot face with equanimity. But that time may yet be, and probably is, a long way off. The ores of the South of Spain are virtually untouched, although, so far as can be ascertained, they are of at least as high quality, and probably can be worked fully as cheaply as those of the North. Between Malaga and Cartagena there are some large and easily worked deposits of high class ores, a few of them running up to about 65 per cent. of iron, and at least one or two of them within twenty miles of the coast. There does not, unfortunately, exist any good geological map of this district, and I am consequently unable to present you with any reliable chart of the location of the ores in question; but explorations have been made at different times by competent mining engineers, and assays have been undertaken by capable chemists, which show the ores of the South of Spain to be well adapted for the Bessemer and open-hearth processes. It is a general characteristic of these ores that they contain considerably more manganese than those found in the North, running up to as much as 4 per cent., and averaging in some districts 3½ to 4 per cent.; while they exist both as hematites and as magnetites, the former occasionally running more or less into spathic ore. But while the presence of so much manganese is probably of little advantage in the general business of smelting, it has been found that ores of this class are admirably adapted for mixing with other high class ores, such as the hematites of West Cumberland and Lake Superior. The mining of these ores has hardly at present commenced. Labor is very cheap in the South of Spain, being little more than one-half of what it costs in the North. On the other hand, there is the drawback of greater distance from England, the Mediterranean being about as far again as the Bay of Biscay, and consequently the cost of transport will probably be higher.

THE GELLIVARA IRON ORES.

The mines in the North of Sweden appear to be those to which attention will be chiefly directed for future supplies to supplement those from the North of Spain. Gellivara (meaning an iron ore mountain) is about 120 miles northwest of Lulea, which is nearly the most northerly port in the Gulf of Bothnia. Last year Gellivara was connected by a railway with that port, and about 50,000 tons of ore were shipped. The railway is substantially built, and has no gradient more than 1 in 100, while every possible facility is given at Lulea for discharging ore quickly and economically. The load of a mineral train is usually 500 tons, moved in twenty hopper wagons carrying 25 tons each, and this train is taken the entire distance of 120 miles in about eleven hours with one engine, or rather with two engines, each running about sixty miles, and providing transport at a cost that is unequalled on any railway of equal length and at all of a similar character. The Gellivara mines have been known for more than a century, and during that time they have been constantly worked on a small scale for local consumption. The ore has also been taken to distant parts of Sweden for very special purposes. The extent of the deposits in Gellivara and the neighboring mountains is unknown, but undoubtedly enormous quantities of ore exist. The mineral is chiefly magnetite, and as far as the

three openings already made can give any idea of the quality, it may be considered to have from 68 to 70 per cent. of iron—three-fifths of the whole being, however, unsuitable for the ordinary Bessemer or open-hearth processes, in consequence of excess of phosphorus. The remaining two-fifths have that metal a little under and a little over the analyses of the following six samples, which I took from about the center of the three workings that were in progress last July:

| ANALYSES OF GELLIVARA IRON ORES. | | | | | | |
|----------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|
| Composition. | 1. | 2. | 3. | 4. | 5. | 6. |
| Peroxide..... | 66.000 | 65.210 | 63.280 | 67.860 | 66.860 | 66.860 |
| Protioxide..... | 30.330 | 31.450 | 30.600 | 29.310 | 29.050 | 29.310 |
| Manganese oxide..... | .070 | .090 | .090 | .070 | .070 | .070 |
| Alumina..... | trace | trace | trace | trace | trace | trace |
| Lime..... | .140 | .150 | .160 | .130 | .110 | .120 |
| Magnesia..... | .130 | .110 | .300 | .110 | .150 | .150 |
| Phosphoric acid..... | .018 | .020 | .023 | .020 | .027 | .030 |
| Sulphur..... | trace | trace | trace | trace | trace | trace |
| Titanic acid..... | .530 | .550 | .490 | .510 | .500 | .500 |
| Silicious residue..... | 2.900 | 2.200 | 5.050 | 1.990 | 3.190 | 3.180 |
| Loss on ignition..... | .400 | .400 | .600 | .400 | .360 | .400 |
| | 100.518 | 100.180 | 100.591 | 100.390 | 100.317 | 100.620 |
| Metallic iron..... | 69.80 | 70.10 | 68.10 | 70.30 | 69.40 | 69.60 |
| Phosphorus..... | .008 | .009 | .010 | .009 | .012 | .010 |
| Average per cent. metallic iron, 69.60; average per cent. phosphorus, .01. | | | | | | |

The railway pursues its course northwest for 180 miles to Ofoten on the Norway coast, where there is open water all the year round. Sixty miles from Gellivara the two iron mountains of Luossavaara and Kuruavara are passed, and these are probably two of the most wonderful iron deposits in the world. Two very complete surveys of them have been made, one in 1877 and the other in 1887, by order of the government and under the direction of the chiefs of the geological bureau; and in the report of that conducted by Herr Tonel and Herr Gummestrus, they estimate the quantity of ore in the two mountains, down to the level of the lake, at 270,000,000 tons. The analyses of the ores give very much the same results as those shown by the ores of Gellivara, except that the proportion of ore low in phosphorus is very much greater in Luossavaara than either at Kuruavara or Gellivara. As samples have only been taken from the surface of the mountains, the estimated proportions of three-fifths and two-fifths may be found to be increased; but so far as small trials have indicated, the proportion of the best ore is likely to be more rather than less than the estimate now given. There is, however, one consideration with regard to the last of these ores that does not pertain to those of Spain, and that is, that being so rich in iron and so low in phosphorus, they may render other ores available for Bessemer iron which cannot now be used for that purpose, as in certain proportions the resulting metal will be within the limit of phosphorus which is necessary for the acid Bessemer converter and the open-hearth furnace.

From the preceding remarks it appears safe to assume that the iron ores still remaining to be worked in the North of Spain, with those in the South of that country and in Sweden, are sufficient to ensure supplies for Great Britain for a very considerable period.

CONDITIONS AFFECTING THE FUTURE DEMANDS FOR BESSEMER ORES.

The future of the demand for iron ores in the United Kingdom is likely to be materially affected by two considerations that are involved at present in much uncertainty, namely, the new discoveries of indigenous Bessemer ores, and the future development of the basic process.

The progress of the basic Bessemer process up to the present time has, in this country at least, been much more limited than many of us anticipated. After having been before the world for eleven years, the quantity of steel made in the United Kingdom in 1888 by the basic process only amounted to 364,000 tons, as compared with 2,941,000 tons made by the ordinary Bessemer and open hearth processes. As the case stands at present, therefore, only 12 per cent. of all the steel made in this country depends upon the use of low-grade phosphoric ores. It appears to be probable that when the patents held under this process expire, which they will do in two or three years, there may be a further advance in the manufacture of basic steel, but up to the present time the public verdict has not been greatly in its favor in the country of its origin; while in the United States the process, although the patent rights were acquired at a comparatively early stage in its history, has been almost neglected and for railway material it is, I am told, not employed at all.

Nor is there very much likelihood of the discovery at home of such important deposits of high-class ores as would relieve us from the necessity of continuing to import from Spain and other countries. Occasionally new deposits are met with in the Cumberland district, and the quantity available on the west coast is no doubt greater than was at one time expected; but the cost of mining has increased, and with one or two exceptions the quality can scarcely compare with some of the older mines. Besides, after the requirements of the local furnaces have been fully met, little will be left to meet the demands of other districts, and Cleveland, Scotland and Wales must therefore apparently depend upon a foreign supply of such ores in the time to come.

What, then, are the prospects that lie before us in the near future in reference to our iron ore supplies? Supplies adapted for the basic process do not require consideration, as there is not as yet any apprehension in reference to the ores of Cleveland, Lincolnshire, etc. But the iron ores of Bilbao, if they are not quite so near exhaustion as some have represented, are yet within measurable distance of becoming scarcer and dearer. I have already indicated that a careful estimate of their extent and probable duration was made some years ago in *Le Génie Civil* by M. Prus, who calculated that there then remained only 50,000,000 tons of ore unworked in the Somorrostro district, since which time some 16,000,000 tons more have been mined there.

It is not necessary that we should commit ourselves to these figures. Since these estimates were made other deposits or mines have been opened up in the district of Bilbao, and there is every likelihood of still further supplies becoming available. But even when we have allowed a liberal discount for possible new discoveries, the outlook as regards the Bilbao deposits is not at all reassuring. According to M. Prus the total supply of the Somorrostro and the inferior ores of the Abando and Ollargan group, found in the mountains at some distance from Bilbao, at the present time will be under seventy five million tons, which is only equal, at the present rate of consumption, to meet the demands of the trade for the next eighteen or nineteen years, after deducting the quantities consumed in the interval. Should the demand increase, as it has done during the last few years, the Bilbao deposits will be exhausted in a much shorter period.

PRICE OF IRON ORES

* * * The problem that now presses for solution is not alone whether we shall for years to come have an adequate supply of iron ores adapted for the Bessemer acid process, and the now scarcely subordinate process of the open hearth, but whether these supplies will be delivered at our works at a price that will enable our iron-makers to compete successfully as they have hitherto done with the iron made in other countries. Those of us who have followed closely the commercial development of the iron trade of the world must have had some misgivings on this point. We have been threatened with a mild extent of competition from the furnaces in the North of Spain, which certainly, with their ores costing only 5s. to 6s. per ton at the furnaces, have substantial advantages over our own iron makers. It is conceivable also that, as the iron ore supplies of Bilbao become further exhausted, the government of Spain may impose restrictions on further exportations, much in the same way as the Italian government has done in reference to Elba ores, and in such a case English pig-makers would be driven to other sources of supply earlier than has been anticipated. The ores of Sweden and those of the South of Spain can hardly, in the nature of the case, be delivered so cheaply as those of Bilbao, but they may relatively be more valuable. Probably the exact cost of such supplies will not be ascertainable for some time. But it will take a considerable period to turn the scale against British-made hematite pig, even if the difference in price should be such as would seem calculated to handicap us in the race. The cheap iron of Luxembourg and Lorraine has now been produced for many years, and yet it has not to any extent seriously affected the almost equally cheap iron of Cleveland and Lincolnshire. And if this is likely to be so in reference to the iron made so near to our own shores, it is likely to be still more the case as regards American-made iron, of which certain estimable people appear to be expecting a deluge before very long. The new iron fields of Alabama have no doubt made very great progress within recent years, and I learn on the authority of my friend Mr. Hewitt, who has recently been there, that iron can be produced in Birmingham, Ala., for about 30s. per ton. But the economic effect of this fact is likely to be much more seriously felt in the Eastern States than in England, and in our own country the influence, if felt at all, will more likely be in the direction of withdrawing the American demand for high-class European ores, which, having regard to their limited supplies, we should certainly have no reason to regret.

COST OF MINING

The iron ores of the United Kingdom are mined under more advantageous conditions, as regards cost, than those of most other countries, notwithstanding that the wages paid to our miners are generally higher than those paid on the continent of Europe. According to official returns, the average quantity of iron ore produced per miner is about 631 tons per annum in Luxembourg, 559 tons in

England and Wales, 352 tons in France, 228 tons in the United States and 213 tons in Germany. If we take into account the fact that the average quality of the iron produced in England is much higher than that of Luxembourg, these figures would seem to indicate that we have the cheapest iron ores of all the great iron-producing countries, even when allowance has been made for differences in the rate of wages.

Nor is our position less favorable as regards the average cost at which the ores are laid down at the blast furnaces. In general, the iron ore mines are less than thirty miles from the place at which they are smelted. This is at any rate the case as regards Cleveland, Lincolnshire, Northamptonshire and the West Coast, which unitedly represent some three-fourths of all the iron ores raised in the country. In continental countries and in the United States no similar advantages exist. Germany brings large quantities of ore from Alsace-Lorraine and Luxembourg to Westphalia and Rhine land. France receives similarly large quantities from considerable distances. Belgium requires to import the bulk of her supplies from Luxembourg. The United States works, again, bring ores, as I have already indicated, distances varying from 700 to 1,000 miles. It is true that other elements than that of mere distance enter into the question under consideration. A high-class ore transported for a long distance may be much cheaper than a lean ore transported for a short distance. In one country the transport for a hundred miles may be relatively much cheaper than the transport for twenty miles in another. But in England we have very little to complain of in either of these matters. Cumberland ore is certainly subject to extraordinary fluctuations, and it is far from agreeable to iron-masters to find the prices of ores jumping up from 12s. to 28s. 6d. per ton, as they did between 1878 and 1880, and falling from 28s. 6d. to 14s., as they did between 1880 and 1881; but in general our West Coast works have nearly as high a quality of ore as that of the Lake Superior region, delivered at their works for just about one-half the cost at which that ore is laid down at American furnaces; while even the new iron region of Birmingham, Ala., is behind our own district of Cleveland as regards the price to the consumer of ores of much the same quality. If the railway companies did as much for English iron-masters as nature has done, our lot would indeed be happy. But with the cheapest ores in the world at command, we have to fight against the dearest transport; and this leads me to express the earnest hope that the efforts now being made by the British Iron Trade Association, in concert with other bodies of traders, will be successful in obtaining lower rates of freight for minerals on English lines.

It cannot fail to be observed that the key to the steel question is the cost of assembling the materials at the furnace.

Such being the fact, the verification of the statements regarding the deposits of ore suitable for making steel in the Southern States becomes the matter of paramount importance. Upon this subject Mr. Abram S. Hewitt made the following remarks at the meeting of the British Institute in the discussion which followed President Smith's paper:

So far as the United States were concerned, he thought there need be no apprehension that there was about to be competition from that quarter. The distribution of ores in that country was on a much more varied scale than Mr. Smith seemed to have understood. After the members of the Iron and Steel Institute had been over in the States next year, and had seen something of the country in this particular, he thought they would come home satisfied that America would have no occasion to trouble with the outside markets of the world as far as raw material was concerned. Mr. Hewitt, having described on the maps the locations of the different ore deposits, said that within twenty-five miles of the State of New York deposits of magnetites were found, of which acid steel could be made, and in Pennsylvania one came across deposits corresponding very much with the Gellivara deposits. There were, he was afraid to say how many, millions of tons; the output now exceeded a million of tons, and it was a 50 per cent. ore. Mr. Smith was in error when he said that the ores were at too great a distance from coal to make the production cheap. The only reason that the production was not extended was that there were limits even to the avarice and ambition of the Americans. As you came into Virginia, the phosphorus to a very great extent disappeared. In Carolina there were vast bodies of magnetites, and if not very near to the coal at present, railways were in course of construction which would bring them within sixty miles of the best coal in the world. He had made a calculation, and believed that coal and iron could be brought together to make pig iron for Bessemer steel at not exceeding 40s. a ton. He knew that this might astonish his hearers, particularly in view of the fact that the American mining industry was dependent upon a duty; but they were slow to learn in the United States, and they honestly believed that they needed this protection, and it would go on until they had tried long enough in their own fat to learn to find some other outlet in the markets of the world. There was a vast deposit of ore, commencing in Tennessee, and thickening until, in Alabama, where a great physical eruption must have taken place at one time, a mountain was covered with a 50 per cent. ore, which was as a rule in admirable condition to be put into the furnace. It was not low enough in phosphorus for the acid Bessemer, but could be used for the basic process. The coal and the ore were only five miles apart, and about five shillings would deliver at the furnace the materials for a ton of iron. Of course this was a combination which, as far as he knew, did not exist anywhere else in the world, and he supposed he might assume that the only drawback at all would be in the higher rate of wages; but there was the vast body of negro labor quite available, and he doubted whether the per diem wage was so much as in England.

III.

Tables taken from the annual statistical report of the British Iron Trade Association for 1889, issued in 1890 by J. S. Jeans, Secretary:

GENERAL SUMMARY OF THE STATISTICS OF IRON AND STEEL IN GREAT BRITAIN FOR 1889 COMPARED WITH 1887 AND 1888.

| Description. | 1889. | 1888. | 1887. |
|-----------------------------------------------------------|-------------|-------------|-------------|
| | Tons. | Tons. | Tons. |
| Total production of pig iron in United Kingdom..... | 8,245,736 | 7,898,634 | 7,441,97 |
| Total production of hematite iron..... | 3,163,063 | 3,180,555 | 3,064,837 |
| Total production of basic iron..... | 669,765 | 475,540 | 471,510 |
| Total production of spiegelstein and ferro manganese..... | 177,316 | 205,134 | 233,190 |
| Total production of puddled bar..... | 2,253,756 | 2,031,473 | 1,701,312 |
| Total production of Bessemer steel ingots..... | 2,140,791 | 2,012,794 | 2,064,403 |
| Total production of Bessemer steel rails..... | 943,048 | 979,083 | 1,021,847 |
| Total production of basic steel..... | 493,919 | 405,594 | 364,526 |
| Total production of open-hearth steel ingots..... | 1,429,169 | 1,292,742 | 981,104 |
| Total production of ironstone under Coal Mines Act..... | 8,270,542 | 8,635,032 | 7,860,918 |
| Total production of coal..... | 176,916,724 | 169,915,219 | 162,119,812 |
| Stocks of pig iron in United Kingdom December 31..... | 1,951,443 | 2,588,708 | 2,778,684 |
| Total deliveries of pig iron..... | 8,882,601 | 8,106,135 | 7,317,067 |
| Shipbuilding tonnage launched..... | 1,288,751 | 904,329 | 577,347 |
| Shipbuilding under construction at 31st December | 872,957 | 811,468 | 439,335 |
| Exports— | | | |
| Total exports of iron and steel from United Kingdom..... | 4,158,388 | 3,966,563 | 4,113,028 |
| Total exports of pig iron..... | 1,190,371 | 1,026,319 | 1,155,174 |
| Total exports of railroad iron and steel..... | 1,091,919 | 1,020,002 | 1,011,779 |
| Total exports of tin plates..... | 430,623 | 511,198 | 354,773 |
| Total exports of coal..... | 28,974,129 | 26,666,462 | 24,460,767 |

PRODUCTION OF MANUFACTURED IRON, INCLUDING RAILS, IN THE PRINCIPAL IRON-PRODUCING COUNTRIES, AS FAR AS PARTICULARS ARE AVAILABLE, FROM 1866 TO 1889.

| Year. | G. Britain. ^a | U. States. ^b | Germany. | France. | Belgium. | Sweden. | Russia. |
|---------|--------------------------|-------------------------|-----------|-----------|----------|---------|---------|
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| 1866 .. | 1,026,059 | .... | 759,114 | 365,452 | .... | .... | .... |
| 1867 .. | 1,039,396 | 641,533 | 704,160 | 340,741 | 167,098 | .... | .... |
| 1868 .. | 1,007,775 | .... | 718,273 | 338,295 | 168,617 | .... | .... |
| 1869 .. | 1,226,356 | 751,467 | 701,201 | 468,565 | 176,668 | .... | .... |
| 1870 .. | 1,291,000 | 886,074 | 617,814 | 491,563 | 189,072 | .... | .... |
| 1871 .. | 1,447,483 | 1,012,759 | 635,876 | 467,216 | 183,080 | .... | .... |
| 1872 .. | 1,847,922 | 1,179,794 | 784,203 | 504,577 | 185,591 | .... | .... |
| 1873 .. | 1,837,430 | 1,182,503 | 780,991 | 480,374 | 175,460 | 255,491 | .... |
| 1874 .. | 1,694,616 | 1,207,419 | 862,254 | 510,920 | 167,719 | 299,496 | .... |
| 1875 .. | 1,599,516 | 1,102,813 | 904,990 | 436,440 | 180,820 | 302,039 | 266,614 |
| 1876 .. | 1,599,269 | 1,017,747 | 873,711 | 399,138 | 212,516 | .... | .... |
| 1877 .. | 1,476,759 | 864,813 | 755,960 | 375,553 | 224,818 | .... | .... |
| 1878 .. | 1,555,576 | 795,136 | 754,335 | 405,472 | 197,860 | 273,738 | .... |
| 1879 .. | 2,047,484 | 992,506 | 793,662 | 410,527 | 205,573 | 280,343 | .... |
| 1880 .. | 2,332,668 | 1,106,800 | 1,026,160 | 493,039 | 231,143 | 292,304 | .... |
| 1881 .. | 2,691,150 | 2,043,927 | 1,019,018 | 470,700 | 200,841 | 292,446 | .... |
| 1882 .. | 2,841,534 | 2,493,831 | 1,496,408 | 1,073,021 | 503,113 | 275,567 | 297,571 |
| 1883 .. | 2,730,604 | 2,348,874 | 1,449,064 | 978,917 | 487,226 | 260,089 | 276,000 |
| 1884 .. | 2,327,535 | 2,029,140 | 1,491,008 | 877,826 | 471,040 | 302,198 | 269,000 |
| 1885 .. | 1,911,128 | 1,747,600 | 1,412,782 | 782,431 | 454,227 | 284,440 | 356,729 |
| 1886 .. | 1,616,701 | 1,624,074 | 1,346,112 | 767,214 | 470,255 | 261,098 | 369,350 |
| 1887 .. | 1,701,312 | 2,595,438 | 1,549,184 | 771,610 | 534,056 | 278,016 | .... |
| 1888 .. | 2,031,473 | 2,397,402 | 1,558,797 | 833,839 | 548,055 | 253,090 | .... |
| 1889 .. | 2,253,756 | .... | 793,364 | 620,054 | .... | .... | .... |

*Fuddled bars only.

^aNet tons of 2,000 pounds.

| PRODUCTION OF PIG IRON IN THE PRINCIPAL IRON PRODUCING COUNTRIES OF THE WORLD, 1854-1889. | | | | | | | | | | |
|-------------------------------------------------------------------------------------------|-----------------|-----------------|-----------|-----------|-----------|----------|-----------|-----------|----------|-------|
| Year. | United Kingdom. | United States.* | Germany.† | France ‡ | Belgium.‡ | Sweden.‡ | Hungary.‡ | Austria.‡ | Others.‡ | |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| 1854 | 3,698,848 | 736,218 | 361,513 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1855 | 3,218,154 | 784,178 | 301,357 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1856 | 3,586,377 | 883,137 | 373,881 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1857 | 3,659,477 | 798,157 | 397,274 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1858 | 3,456,064 | 705,094 | 413,343 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1859 | 3,712,354 | 840,627 | 399,892 | 758,682 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1860 | 3,889,752 | 9,277,770 | 395,741 | 797,912 | 319,943 | ..... | 312,554 | ..... | ..... | ..... |
| 1861 | 3,829,390 | 7,115,544 | 449,339 | 829,481 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1862 | 3,943,469 | 787,662 | 526,077 | 928,574 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1863 | 4,510,040 | 947,604 | 636,679 | 933,997 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1864 | 4,707,951 | 1,135,996 | 705,967 | 1,034,161 | ..... | ..... | ..... | ..... | ..... | ..... |
| 1865 | 4,819,254 | 931,552 | 771,903 | 989,972 | 470,767 | ..... | ..... | ..... | ..... | ..... |
| 1866 | 4,523,897 | 1,350,343 | 803,551 | 992,710 | ..... | ..... | 284,638 | ..... | ..... | ..... |
| 1867 | 4,761,023 | 1,461,626 | 987,668 | 931,906 | 423,069 | ..... | 319,902 | ..... | ..... | ..... |
| 1868 | 4,970,203 | 1,603,000 | 1,053,260 | 934,868 | 435,754 | ..... | 395,077 | ..... | ..... | ..... |
| 1869 | 5,445,757 | 1,916,641 | 1,80,579 | 1,018,997 | 334,319 | 285,065 | 405,082 | ..... | ..... | ..... |
| 1870 | 5,995,215 | 1,865,000 | 1,155,591 | 923,842 | 565,234 | 293,438 | 402,953 | ..... | ..... | ..... |
| 1871 | 6,627,179 | 1,911,608 | 1,297,940 | 859,641 | 609,230 | 293,277 | 424,606 | ..... | ..... | ..... |
| 1872 | 6,741,926 | 2,854,558 | 1,457,835 | 1,217,838 | 655,565 | 334,788 | 459,625 | ..... | ..... | ..... |
| 1873 | 6,566,451 | 2,868,226 | 1,573,715 | 1,266,922 | 677,373 | 339,048 | 534,507 | ..... | ..... | ..... |
| 1874 | 5,991,408 | 2,689,413 | 1,906,262 | 1,423,307 | 532,790 | 322,154 | 494,654 | ..... | ..... | ..... |
| 1875 | 6,365,462 | 2,266,551 | 2,029,389 | 1,416,397 | 540,473 | 343,551 | 454,574 | ..... | ..... | ..... |
| 1876 | 6,555,997 | 2,093,265 | 1,846,345 | 1,453,112 | 490,508 | 344,834 | 400,426 | ..... | ..... | ..... |
| 1877 | 6,608,665 | 2,314,558 | 1,932,725 | 1,522,266 | 470,488 | 336,370 | 409,000 | ..... | ..... | ..... |
| 1878 | 6,300,000 | 2,577,361 | 2,147,641 | 1,508,246 | 493,544 | 333,496 | 424,249 | ..... | ..... | ..... |
| 1879 | 6,009,434 | 3,070,587 | 2,226,587 | 1,344,759 | 448,371 | 348,000 | 404,160 | ..... | ..... | ..... |
| 1880 | 7,721,833 | 4,295,414 | 2,729,038 | 1,733,102 | 610,000 | 405,713 | 465,518 | ..... | ..... | ..... |
| 1881 | 8,377,464 | 4,641,564 | 2,914,000 | 1,894,954 | 624,736 | 435,428 | 543,000 | ..... | ..... | ..... |
| 1882 | 8,493,287 | 5,178,121 | 3,380,805 | 2,033,000 | 725,946 | 379,945 | 611,081 | ..... | ..... | ..... |
| 1883 | 8,490,224 | 5,146,719 | 2,069,387 | 783,433 | 422,627 | 710,037 | ..... | ..... | ..... | ..... |
| 1884 | 7,528,965 | 4,589,613 | 3,660,612 | 1,855,247 | 750,812 | 439,534 | 716,620 | ..... | ..... | ..... |
| 1885 | 7,297,295 | 4,529,859 | 3,687,433 | 1,830,648 | 712,876 | 404,737 | 699,000 | ..... | ..... | ..... |
| 1886 | 6,870,695 | 6,365,328 | 3,528,658 | 1,507,850 | 701,277 | 442,457 | 718,105 | ..... | ..... | ..... |
| 1887 | 7,441,927 | 7,187,236 | 4,023,953 | 1,610,851 | 755,781 | 456,625 | 704,532 | ..... | ..... | ..... |
| 1888 | 7,868,634 | 7,268,057 | 4,337,121 | 1,688,976 | 826,850 | 457,052 | 785,939 | ..... | ..... | ..... |
| 1889 | 8,245,336 | 8,517,068 | 4,387,504 | 1,567,622 | 847,260 | ..... | ..... | ..... | ..... | ..... |

* Net tons of 2,000 pounds.

† The production given under the head of Germany includes Luxembourg from 1874.

‡ Metrical to a.

| PRODUCTION OF BESSEMER STEEL INGOTS IN THE PRINCIPAL STEEL-PRODUCING COUNTRIES, 1866 TO 1889. | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------|----------------|-----------------|-----------|-----------|-----------|-----------|----------|----------|-------|-------|
| Year. | Great Britain. | United States.* | Germany.† | France ‡ | Belgium.‡ | Austria.‡ | Sweden.‡ | Russia.‡ | | |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| 1866 | ..... | ..... | 83,737 | 28,266 | 1,460 | 6,835 | ..... | ..... | ..... | ..... |
| 1867 | ..... | ..... | 88,589 | 36,855 | 1,767 | 8,765 | ..... | ..... | ..... | ..... |
| 1868 | 110,000 | 8,500 | 93,690 | 66,320 | 14,500 | 14,495 | 13,500 | ..... | ..... | ..... |
| 1869 | 160,000 | 12,000 | 109,753 | 97,264 | 3,699 | 20,722 | 13,150 | ..... | ..... | ..... |
| 1870 | 215,000 | 40,000 | 125,814 | 83,788 | 5,977 | 22,112 | 12,193 | ..... | ..... | ..... |
| 1871 | 320,000 | 45,000 | 143,305 | 79,811 | 10,854 | 24,512 | 8,531 | ..... | ..... | ..... |
| 1872 | 410,000 | 120,100 | 180,337 | 130,088 | 14,085 | 35,104 | 15,885 | ..... | ..... | ..... |
| 1873 | 490,000 | 170,652 | 247,549 | 155,668 | 21,268 | 76,821 | 15,685 | ..... | ..... | ..... |
| 1874 | 620,000 | 201,533 | 324,695 | 217,072 | 36,584 | 96,958 | 21,312 | ..... | ..... | ..... |
| 1875 | 700,000 | 320,980 | 317,764 | 239,205 | 53,500 | 87,443 | 19,367 | ..... | ..... | ..... |
| 1876 | 750,000 | 560,587 | 391,110 | 249,560 | 84,861 | 97,470 | 16,995 | 40,000 | ..... | ..... |
| 1877 | 827,226 | 462,507 | 281,800 | 115,000 | 85,000 | 281,800 | 19,335 | 62,000 | ..... | ..... |
| 1878 | 834,511 | 829,439 | 469,190 | 339,410 | 85,000 | 86,000 | 20,400 | 203,000 | ..... | ..... |
| 1879 | 1,044,480 | 1,074,264 | 660,591 | 384,086 | 95,000 | 101,000 | 30,013 | 295,568 | ..... | ..... |
| 1880 | 1,441,719 | 1,539,157 | 897,425 | 418,094 | 125,000 | 130,000 | 39,328 | 285,032 | ..... | ..... |
| 1881 | 1,673,649 | 1,696,450 | 1,074,366 | 454,053 | 178,000 | 150,000 | 47,359 | 249,000 | ..... | ..... |
| 1882 | 2,012,794 | 2,812,500 | 1,862,676 | 1,851,417 | 306,000 | 68,620 | ..... | ..... | ..... | ..... |
| 1883 | 2,140,793 | 3,169,643 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* The American production is given in net tons of 2,000 pounds.

† There are no separate statistics of the production of Bessemer ingots, as ingots, for Germany, France, Austria and Sweden; the figures refer to finished steel. The returns for Germany include Siemens steel, as no separate returns of this description are available. The figures for Russia include steel of all kinds up to 1885, for which year and for 1886 only Bessemer steel is given.

| TOTAL IMPORTS OF IRON ORES INTO DIFFERENT COUNTRIES, 1866-1889. | | | | | | | | | | |
|-----------------------------------------------------------------|----------------|----------------|-----------|----------|----------|-----------|---------|----------|-------|-------|
| Year. | Great Britain. | United States. | France. | Germany. | Austria. | Italy. | Sweden. | Belgium. | | |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| 1866 | ..... | ..... | 450,273 | 106,488 | 301,846 | ..... | ..... | ..... | ..... | ..... |
| 1867 | ..... | ..... | 491,565 | 157,813 | 322,891 | ..... | ..... | ..... | ..... | ..... |
| 1868 | 114,435 | ..... | 553,563 | 151,558 | 396,282 | ..... | ..... | ..... | ..... | ..... |
| 1869 | 131,321 | ..... | 592,182 | 242,939 | 541,900 | ..... | ..... | ..... | ..... | ..... |
| 1870 | 205,310 | 17,302 | 621,261 | 300,108 | 568,571 | ..... | ..... | ..... | ..... | ..... |
| 1871 | 281,024 | 181 | 378,235 | 270,176 | 594,405 | ..... | ..... | ..... | ..... | ..... |
| 1872 | 301,503 | 26,656 | 620,518 | 284,536 | 739,593 | ..... | ..... | ..... | ..... | ..... |
| 1873 | 667,536 | 62,241 | 720,518 | 400,509 | 739,541 | ..... | ..... | ..... | ..... | ..... |
| 1874 | 754,141 | 69,257 | 816,110 | 48,031 | 738,835 | ..... | ..... | ..... | ..... | ..... |
| 1875 | 458,093 | 73,329 | 832,800 | 220,916 | 804,370 | ..... | ..... | ..... | ..... | ..... |
| 1876 | 672,235 | 26,420 | 975,631 | 197,537 | 671,134 | ..... | ..... | ..... | ..... | ..... |
| 1877 | 1,114,434 | 41,473 | ..... | 328,184 | 783,266 | ..... | ..... | ..... | ..... | ..... |
| 1878 | 1,173,800 | 29,705 | 932,385 | 316,000 | 833,622 | ..... | ..... | ..... | ..... | ..... |
| 1879 | 1,083,692 | 284,111 | 941,512 | 316,000 | 614,534 | 607,007 | 921,784 | ..... | ..... | ..... |
| 1880 | 2,634,404 | 493,000 | 1,186,887 | 1,87,810 | 615,490 | 1,169,206 | ..... | ..... | ..... | ..... |
| 1881 | 2,449,477 | | | | | | | | | |

It. Taking the unsold stocks just as reported, the following furnishes a statement showing the relative consumption in the first half of the last five years:

| CONSUMPTION OF DOMESTIC PIG IRON. | | | | | |
|-----------------------------------|---------------------------|-----------|-----------|-----------|-----------|
| | NET TONS of 2,000 Pounds. | | | | |
| First Six Months. | 1890. | 1890. | 1888. | 1887. | 1886. |
| Production. | 5,109,717 | 4,100,995 | 3,382,503 | 3,415,200 | 2,954,200 |
| Increase in stock. | 133,919 | 227,125 | 63,124 | 12,013 | 53,909 |
| Consumption. | 5,035,818 | 3,873,890 | 3,219,379 | 3,403,179 | 2,900,300 |

*Including increase in stocks in the yards of the American Pig Iron Storage Warrant Co.

These figures reflect just as striking growth in consumption as in production, the consumption for the six months of 1890 standing at 5,035,818 tons, against only 3,873,890 tons in the first six months of 1889, and but 2,900,300 tons in the first six months of 1886. In the first half of 1885 the consumption was only a little above two million tons.

There is one other circumstance to take into consideration, namely, the imports. These, in some years, have been heavy; now they are quite moderate. The extent of the difference is important, because with smaller foreign supplies there was, of course, greater room for the use of home supplies. We have prepared the following to show the imports during the first six months of the last four years. The figures embrace not only pig and scrap iron, but iron and steel in all its various forms, including tin plates, the idea being to set out the full movement. The figures are given in gross tons of 2,240 pounds, as that is the customary way of stating them:

| IMPORTS OF IRON AND STEEL INTO UNITED STATES. | | | | | |
|-----------------------------------------------|---------|---------|---------|---------|-------|
| | 1890. | 1889. | 1888. | 1887. | 1886. |
| Gross Tons of 2,240 lbs. | 314,969 | 404,591 | 472,089 | 960,649 | |
| First six months. | | | | | |

As compared with the year preceding, the change is not so important, being only 89,622 gross tons (or say 100,000 net tons), but as compared with 1887 the total imports now are only 314,969 gross tons, against 960,649 gross tons, being a falling off of 645,680 gross or 723,161 net tons. However, in considering the effects of this falling off in adding to the quantity to be supplied at home, it must be remembered that in the same period there has been a marked contraction in the amount of iron needed for new railroad construction, the total of new road built in 1887 having been the largest ever reached.

As in our enlarging production the South is playing quite an important part, it will be worth while giving its output separate from the rest of the country, and making a comparison on the same for a series of years. This we have done in the following:

| PRODUCTION OF PIG IRON IN SOUTHERN STATES. | | | | | |
|--------------------------------------------|-----------------------|---------|---------|---------|---------|
| | TONS of 2,000 Pounds. | | | | |
| First Six Months. | 1890. | 1889. | 1888. | 1887. | 1886. |
| Alabama..... | 463,451 | 364,346 | 169,696 | 141,921 | 146,280 |
| Tennessee..... | 143,493 | 147,401 | 122,817 | 119,687 | 95,045 |
| Virginia..... | 166,401 | 112,328 | 92,495 | 81,773 | 69,768 |
| West Virginia..... | 63,639 | 72,775 | 45,601 | 32,590 | 49,932 |
| Kentucky..... | 25,540 | 23,865 | 21,267 | 24,915 | 19,351 |
| Georgia..... | 19,526 | 11,336 | 23,648 | 23,914 | 22,659 |
| Maryland..... | 72,632 | 10,333 | 6,250 | 17,127 | 11,193 |
| Texas..... | 5,817 | 1,411 | 2,968 | 1,949 | 250 |
| North Carolina..... | 1,401 | 922 | 1,100 | 1,400 | 1,000 |
| Total..... | 961,966 | 744,619 | 485,852 | 445,226 | 415,528 |
| | | | | | 342,537 |

Thus the South produced almost a million tons (961,966 tons) during the first half of 1890, or not far from one-fifth of the output for the whole country. In the corresponding period of 1889 the make of the South was 744,619 tons, and in 1888 only 485,852 tons. Alabama alone now turns out almost as much iron (its output for six months of 1890 is 463,451 tons) as the entire South only two years ago. Still, as against Alabama's total of 463,451 tons, that of Ohio for the same period is 682,681 tons, and that of Pennsylvania 2,546,501 tons, so that if Alabama holds third position, she is yet a great way in the rear of Pennsylvania, the first.

In connection with the foregoing facts the following article from the Engineering and Mining Journal, under the heading of "Where Is All the Iron Going?" is of interest:

The census statistics of the production of pig iron for the year ending June 30, 1890, which we published last week, showing the enormous aggregate of 9,579,799 tons, call renewed attention to the extraordinary development of our iron industry during the last few years, and raise the question, What becomes of all the iron? Previous to 1880 the answer was easy—"the railroads take it"—for the consumption of iron and steel rails alone, not to speak of iron used in other shapes by the railroad companies, constituted more than one-third of the whole iron consumption of the country. Mr. Swank's statistics of consumption, which are made by adding to the production the tonnage imported each year, and making proper correction for differences in stocks at the beginning and end of the year, show that from 1864 to 1879 inclusive the consumption of iron and steel rails was more than one-third the consumption of pig iron, and that in 1871 and 1872 it was more than one-half. In 1880 the proportion of rails to pig iron dropped to less than one-third, over-reaching it again, however, in 1881 and 1882, but dropping below it in 1883, becoming less than a quarter in 1884 and less than a fifth in 1889. The following table shows the consumption of pig iron, iron and steel rails and the difference between them for the years 1879 to 1889 inclusive:

| CONSUMPTION, GROSS TONS. | | | | | |
|--------------------------|-----------------------|-------------|-------------------------------------------|-----------|--|
| | Iron and steel rails. | Difference. | Approximate consumption other than rails. | | |
| 1879..... | 2,829,429 | 995,604 | 1,833,325 | 1,684,000 | |
| 1880..... | 4,589,848 | 1,458,003 | 3,131,845 | 2,936,000 | |
| 1881..... | 4,562,103 | 1,948,812 | 2,613,291 | 2,706,000 | |
| 1882..... | 5,119,368 | 1,803,517 | 3,315,851 | 3,080,000 | |
| 1883..... | 5,029,112 | 1,324,97 | 3,696,145 | 3,514,000 | |
| 1884..... | 4,381,040 | 1,010,159 | 3,350,881 | 3,197,000 | |
| 1885..... | 4,196,485 | 981,181 | 3,215,304 | 3,089,000 | |
| 1886..... | 5,945,003 | 1,611,014 | 4,333,959 | 4,094,000 | |
| 1887..... | 6,830,067 | 2,216,683 | 4,619,384 | 4,298,000 | |
| 1888..... | 6,815,255 | 1,540,724 | 5,274,531 | 5,064,000 | |
| 1889..... | 7,801,059 | 1,546,481 | 6,253,588 | 6,005,000 | |

The last column is made from the one headed "Difference" by subtracting from the latter 15 per cent. of the rail production each year as an estimated allowance for waste in conversion from the pig iron to the rail. Any error in this estimate will not seriously alter the figures in the last column, which fairly represent the amount of iron used in the United States for other purposes than the manufacture of rails.

The figures for 1879 look small compared with those of the succeeding years, but they were larger than those of any preceding year, the nearest approach to them being in 1874 when the approximate consumption other than rails was only 1,496,000 tons.

A glance at these figures shows that the consumption of iron for other purposes than rails in 1889 was over four times as great as in 1874, over three times as great as in 1879 and over twice as much as in 1882; that in the eight years from 1874 to 1882 the consumption doubled, and in the seven years from 1882 to 1889 it doubled again. The census figures for the production of pig iron for the year ending June 30th, 1890, indicate that the year 1890 will show a rate of increase even greater than that of any preceding period. This most extraordinary and persistent increase in the use of iron for other purposes than rails is a phenomenon of no trifling importance. It indicates either the progress of a revolution in constructive methods, or a tremendous increase in the wealth of the people, or both. We are inclined to believe both causes contribute to the result.

The country is growing richer at a wonderful rate, and strong, durable and therefore expensive structures are replacing those of temporary character, used when money was not so plentiful. It years gone by the chief idea of the American engineer in designing structures was to make them light, and to economize iron and steel to the utmost degree. Waste of metal was looked on almost as a crime. Now, however, we seem to be approaching English practice, in making strength the first consideration and cost the last. This tendency of itself is enough to account for a greater part of the increase in iron consumption.

But there is also in progress a substitution of iron and steel for wood, stone and brick to an extent hitherto unknown. The era of tall buildings is calling for iron and steel structural shapes to replace the other building materials. We are informed of a ten story building now being erected in New York, in which the walls are only 12 inches thick. Real estate is so exceedingly valuable in New York that floor space must be economized to the utmost, as offices are rented at the rate of \$2 and upward per square foot per year. It is estimated that in such a building \$5,000 a year more rent can be obtained if the walls are made only 12 inches thick than if they were 24 inches thick. To make such a building with 12-inch walls would be an impossibility with wood, brick or stone. Hence the necessity of using steel. The whole framework of the building is made of 12-inch channel and I

beams, and the spaces in the frame filled in with brick. The floors, stairways, etc., are also made of iron, with fire brick filling.

No doubt the greater part of the increase in consumption of iron is due to this demand for high buildings, and the necessity for such buildings being a permanent one, the increase is likely to continue at its present rate for some time to come.

For the remainder of the data of which I have made use in this treatise I am indebted to the census reports of 1880 by Messrs. James M. Swank, Raphael Pumpelly and his assistants, and by Mr. Joseph D. Weeks; also to the reports upon the coke industry of the United States contributed to the geological survey by Joseph D. Weeks, and for the data of higher wages and diminishing cost of production to what may be called the monumental volume No. XX on prices and wages contributed to the U. S. census of 1880 by Mr. Weeks.

In view of the present exhaustive investigation in respect to the product per man, the cost of labor and other elements on which the future center of iron production will in some measure depend, which is now being conducted by Commissioner Carroll D. Wright, it may be judicious to close this treatise with a statement of the facts developed by the census of 1880, as they will be useful for future reference.

The product of iron in the United States has been increased about one hundred and fifty per cent. since the census year, and the great development of the Southern iron industry has been made since that date, while many improvements and inventions have doubtless led to the employment of a less proportionate number of hands at higher rates of wages and at a lower cost of labor in every department of mining and metallurgy. These figures are, therefore, given at the present time merely as a mark, by the way, in the progress of applied science.

In the census year about twenty per cent. of the coal mined was consumed in blast furnaces, rolling mills and steel works.

At the high estimate of two tons of bituminous coal to one ton of coke the proportion of all kinds of coal used in blast furnaces only was 7,923,445 tons.

Assigning to this coal the proportionate number of hands employed in mining and handling it, the following table will give a very close approximation to the several elements of the labor cost in a ton of iron ten years since:

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Hands employed about nine months in that specific year in mining, sorting and handling coal for use in blast furnaces, including proportion of foremen, &c. | 18,983 |
| Sum of their wages..... | \$6,038,000 |
| Tons of coal..... | 7,923,445 |
| Labor cost per ton at mine..... | 77 cents. |
| Number of hands employed in the coke industry for the supply of all branches of the iron and steel industry..... | 3,068 |
| Sum of their wages..... | \$1,198,654 |
| Number of hands employed in iron mines of regular industry raising 7,061,829 tons of ore, to which were added 909,877 tons gathered from the surface by farmers in the winter..... | 31,668 |
| Sum of their wages for about nine months' work by estimate..... | \$9,538,117 |
| Labor cost per ton of ore at mines of regular industry..... | 113 |
| Hands employed in all blast furnaces working by estimate about nine months..... | 41,875 |
| Tons pig iron produced..... | 3,781,021 |
| Sum of their wages..... | \$12,680,703 |
| Labor cost per ton for conversion at furnace..... | 33-36 |

As the proportions of coal, coke, ore, etc., vary in different places to the ton of iron, the labor cost per ton of pig iron can only be computed by reference to specific and not to general figures.

Reference may be made to the reports of the census experts for other facts regarding this industry, in order that the progress in the last decade may be estimated by a comparison of the foregoing data with the present figures.

With this statement this treatise will be submitted for full consideration, but the following question may well be put in conclusion: If the United States must of necessity increase its present production of a little over ten million net tons of iron out of twenty-eight million now required by the world, to thirty million tons or more out of fifty to sixty million tons which may be needed ten years hence, would it not be almost grotesque to keep taxes upon the import of coal and upon ores which it may still be expedient to mix with our own in some places, when these materials are free from taxation in all the other great iron producing countries with which we compete?

Iron Displacing Wood.

We are reminded by the presence in St. Louis, in convention, of our esteemed friends and trade cousins, the manufacturers and dealers in lumber, that an interesting economic change is now in progress, involving the substitution of iron for many purposes in which lumber has been employed hitherto. Our friends in the lumber trade have the sagacity to perceive this tendency, and one of their excellent trade journals, represented in the present assembly, has already given space to certain observations of a leading Western lumber merchant, to the effect that a large falling off in the trade in white pine of late years is in part due to the extensive introduction of iron in many capacities where wood was formerly employed. This observant dealer cites in particular the use of iron window frames, wire netting in place of laths and tiles instead of wood for flooring. But the illustration of the change going on might be enlarged almost indefinitely. Our advertising columns from time to time present the claims of sheet iron for siding and roofing, cornice work, metallic ceilings and kindred purposes connected with building; and the use of heavier iron in the form of girders, in the place of wooden joists, has become almost universal in the more costly buildings, while the substitution of frames made of iron instead of wood has become a question of expense rather than of adaptability. Experiments

in the substitution of steel for wood are also in progress. Cheapness has opened new uses to iron and increased its consumption, while the converse is true of lumber—that its use has diminished in proportion to its advancing cost.—Stoves and Hardware Reporter.

Increasing Prosperity.

SALISBURY, N. C., Sept. 18, 1890.

This section does not look for the booms, but takes a very conservative course. The general prosperity of the farmer is better than it has been for some time. The crops of corn, cotton and tobacco are better than for several years. This gives confidence to the merchant, and we find there is not near so much mortgaging by the farmer as heretofore, hence collections are better. The building and operating of a cotton factory a knitting factory that has recently increased its facilities, the building of the Yadkin Railroad through several counties that will open up a new trade and give an outlet heretofore needed, the organization and working of several new granite quarry companies to supply all kinds of granite, together with several other kinds of manufacturing industries, show the disposition of our people to become more self-sustaining. This in itself establishes confidence, and it is with pleasure that we are permitted to make known through your valuable paper the healthy, substantial growth of our section, as is partially evidenced by this place having about doubled its population in the last decade.

DAVIS & WILEY BANK.

A Large Majority of the Members of the British Iron and Steel Institute to Visit the South.

For three or four months the MANUFACTURERS' RECORD has been making vigorous efforts to induce the foreign iron and steel makers who are to spend October in the United States to visit the South. We have kept up an active correspondence with the individual members of the English Iron and Steel Institute, and have urged them to include the South in their trip, and have supplied each one with much data about Southern mineral resources. The large majority of these visitors are readers of the MANUFACTURERS' RECORD, and from it they have learned of the great mineral wealth of this favored section.

In view of the quiet but persistent effort that we have been making to attract these gentlemen to this section, it is especially gratifying to be able to announce that we have already secured the names of 184 who have agreed to go on the Southern excursion. The total number of delegates from the English Iron and Steel Institute will be about 300, and of these we have word so far, as already stated, of nearly two-thirds who intend to go South in preference to the Lake Superior trip. In fact, only about 50 members had signified their intention of taking the Northern trip up to the time of sailing from Europe. We can safely count on 200 members of the English Institute and 75 to 100 of the German and French visitors, or an aggregate of about 300, to which must be added many American iron and steel makers and quite a number of ladies for the Southern trip. The South must, therefore, be prepared to royally entertain at least 400 to 500 guests. It is gratifying to note that many of the most distinguished iron and steel makers of Great Britain, including such men as Sir James Kitson, president of the British Iron and Steel Institute; S. r Lowthian Bell, ex-president; J. S. Jeans, secretary, and P. C. Gilchrist and E. P. Martin, directors, are among the number who realize the advisability of making a personal examination of the South's iron and coal resources. The names of those so far reported to us as going South are:

Adamson, Joseph
Andrew, Fredk.
Armstrong, Geo.
Armstrong, W. I.
Ashbury, Thomas
Baldwin, Stanley
Bamlett, A. C.
Banks, Henry
Bantock, Thos.
Barrow, James
Bayard, Paul
Beardshaw, Wm.

Beckwith, John H.
 Bell, Hugh
 Bell, Sir Lowthian, Bart.(Past-Presid'')
 Bennie, James
 Benson, R. S.
 Bevan, Isaiah
 Birkbeck, Frank
 Birkbeck, Henry
 Blair, G. M.
 Bleichert, A.
 Bond, Geo
 Bradley, B. G.
 Bright, William
 Brooke, E. B.
 Brooke, F. H.
 Bruce, J. M.
 Bruce, W. Duff
 Brustlein, H. A.
 Buckley, James
 Buckton, W.
 Butler, Edmund
 Byers, W. L.
 Byles, A. R.
 Chadwick, David
 Chatwood, Saml.
 Coghlan, J. H.
 Colley, F. H.
 Colville, John
 Cook, Jos.
 Cook, Thos.
 Crawhall, L. W.
 Crawhall-Wilson, T. W.
 Crippin, Frederick
 Crowther, Clement
 Danielsson, C.
 Darby, John H.
 Dickinson, E.
 Dixon, S.
 Dronsfield, W
 Drummon l, S.
 Dunnachie, A. H.
 Edge, J. H.
 Edwards, W. H.
 Ellison, J.
 Evans, Christmas
 Farley, R.
 Farnworth, W.
 Fearneough, W.
 Fellows, S. J.
 Frth, W. E.
 Fisher, E. K.
 Geen, George
 Geen, W. R.
 Gielgud, Hy.
 Gilchrist, Percy C.
 (Member of council.)
 Gregory, Jos.
 Grigg, Rich.
 Gubbins, R. R.
 Hall, J. F.
 Hallbauer, Joseph
 Haniel, Hugo
 Hanson, E.
 Harrison, G. H.
 Harrison, G. K.
 Harrison, W. B.
 Hawdon, Wm.
 Head, A. P.
 Head, Jeremiah
 Heath, Robt., Jr.
 Henning, Gustav. A.
 Heywood, H.
 Hingley, Benj.
 Hobson, J. F.
 Horsfield, A.
 Hulton-Harrop, W.
 Hunt, Chas.
 Hunter, Wm
 Huntington, A. K.
 Hutton, A. W.
 Jackson, W. F.
 James, C. H.
 Jamieson, J. F. F.
 Jeans, J. S.
 Jenkins, Sir J. J.
 Jenks, I. J.
 Jenks, Walter
 Jones, Henry
 Kearsley, George
 Keen, A.
 Kirk, Henry
 Kitson, Sir Jas. Bart.
 (President.)
 Laybourne, Richd.
 Lewis, Sir W. T.
 Lindberg, Carl C. Son.
 Lowood, J. G.
 Marsden, Benj.
 Martin, Edward P.
 (Member of council.)
 Matheson, Ewing
 Mayberry, Jos.
 M'Anally, Peter
 M'Cowan, Wm.
 Molinaux, Wm.
 Monks, Fred
 Morgan, S. V.
 Muir, A.
 Muller, T. N.
 Nettlefold, J. S.
 Norbury, W. E.
 Oakes, G. R.
 Owen, David
 Page, John
 Pattison, J.
 Pearson, J. H.
 Pease, Jos. A.
 Pease, J. F.
 Peech, Hy.
 Percy, T. M.
 Platt, Jas.
 Plowden, Sir Wm.
 Powell, H. G.
 Pugh, Ch. H.
 Radcliffe, Wm.
 Reay, T. M.
 Renton, B. M.
 Richards, J.
 Riley, Edward
 Rogers, John Hy.
 Rogerson, John E.
 Rogerson, W. E.
 Rollason, Jas.
 Rummens, Chas.
 Rummens, F. W.
 Ryder, George
 Ryland, Wm.
 Salter, Geo.
 Saunders, Jas.
 Scarf, F.
 Scoular, Geo.
 Senhouse, H. P.
 Senior, Geo.
 Shanks, Wm.
 Sheffield, R. S.
 Shipman, J. W.
 S mpson, H. C.
 Simpson, J. S.
 Smith, G. J.
 Sochor, Baron F.
 Squire, E. L.
 Squire, W. S.
 Stanley, Hon. E. L.
 Stead, J. E.
 Steel, Wm.
 Storr, Frederick
 Summers, John
 Taylor, J. S.
 Thackray, Wm., Jr.
 Thomas, R. B.
 Thomas, Wm.
 Tozer, Wm.
 Walton, Jos.
 Warburg, F. E.
 Ware, C. W.
 Webb, Hy.
 Whitwell, J. F.
 Whitwell, Wm.
 Whitwell, W. F.
 William, Wm.
 Williamson, Richard
 Wilson, R. T.
 Wragg, John D.
 Young, John

Young,
Younger, John

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THE FUTURE OF ROANOKE CITY.

BY THOMAS P. GRASTY

Figuring from a standpoint of severest conservatism, there will in five years be eighteen to twenty millions more people in the United States than there are in this year of grace 1890. No more fascinating study can be conceived of than the probable distribution of this vast horde of mortality struggling for possession of the fittest fields—fields where money first, and health and happiness second, may be obtained with the greatest certainty. During the entire summer just passed (during which I have written nothing) this question has absorbed my thoughts, when I have thought at all, to the exclusion of all others. While fishing in the mountain brook, while lying in wait for the festive squirrel, while stretched on the grass under broad-spreading beeches, I have scarce for a moment ceased to consider the chances for money-making which a correct calculation of the forthcoming distribution of population absolutely guarantees.

And in view of the fact that this is a census year, when so much attention is being attracted to comparisons of the results of that distribution during the last ten years, I have felt no little amazement that everybody else wasn't thinking about just what I was.

Convince any syndicate you may that within a given area there is without doubt a lump of gold as big as a barrel, whose exact location may be scientifically determined, and that syndicate will employ scores of experts to find that lump of gold. Now, the profit that may be reaped from ascertaining in advance which particular section of the Union is going to get the bulk of the eighteen or twenty millions or more of people who will be added to the country's population within the next five years, will be a larger profit than any lump of gold, or any diamond mine, for that matter, was ever made to yield.

The love of new things, the hope of finding something that other people will want, and want bad enough to buy at a big price, the Anglo-Saxon mania for discovery and development, has always been the chief force behind the tide of population. When Indiana and Illinois were new the tide rolled there, then across the Mississippi, and only last year thousands rushed pell-mell into Oklahoma, alas! only to find out the "hot wind's" fell effect on cereals planted where the summer rain falls not. This same Anglo-Saxon trait will likewise largely determine which locality will get the major proportion of the millions that will seek new homes from this time on, and now that Kansas is settled and Nebraska is settled, and most of the habitable districts of Dakota and Colorado are settled, and there is nowhere anything new in sight this side of the new State of Washington, the South is all that is left to be developed. The South is the only field for exploration left on the continent—at all events, where there is law and order and a good climate. And so, for the last year or two the restless, speculating, venturesome, nervy, excitement-loving seeker of new fields has been looking Southward. It has come to be generally admitted that the tide which has flowed so steadily westward for the last two or three decades is coming South.

But the South covers an enormous area, so enormous that the question, at least from a standpoint of individual interest, remains virtually as much unanswered as before the public began to consider the South as a field for money-making. Moreover, the influx of men and money is not going to be like butter spread all over a slice of bread from the Potomac river to the Rio Grande. There are going to be centers where excite-

ment may be generated, for without excitement no progress was ever made in the development of resources. From these centers the moving moiety of the twenty millions of our additional population will ramify every region where there is a chance to make money.

The particular center, which in my opinion will have the first call, one which will far exceed Kansas City in its most feverish era, as a rendezvous for home-seekers, and seekers of things that may be got easily and cheaper and sold at fabulous profit, is to be Roanoke, Virginia.

There will be many other centers, just as there are many planets, but there is only one sun in each system. As was stated a moment ago, the whole South will undergo a quickening, but not all at one jump, and therefore the question asked by practical men looking Southward is "which slice of the loaf is going to be buttered first?"

Unquestionably, the great valley between the Potomac river on the north and the Tennessee river region toward the South of which Roanoke is the actual center. The excitement and development having first passed through this great valley of valley (or rather this great network of valleys, as one may realize by getting off the cars at Cambria on the Norfolk & Western and looking from that high plateau 70 miles to the clearly visible Peaks of Otter), will go on down through East Tennessee, invading Western North Carolina, to the Tennessee valley, where a beginning has been made at Cardiff and Rockwood, past Chattanooga, following the East Tennessee Railroad to the section of which Tredegar in Alabama will be the center, and just beyond which the Blue Ridge mountains sink, as it were, back down into the bowels of the earth.

To be still more exact, the belt of first activity, the belt which will get a million at least of the new population during the next five years, begins with the Shenandoah valley proper, follows it to its head, then in the same Southwestward direction through the series of valleys; embraced by the counties of Rockbridge, Botetourt, Roanoke, Craig, Bedford, Franklin, Montgomery, Pulaski, Wythe, on past Bristol for a considerable distance into East Tennessee.

This belt is the richest in the world. It is almost a new country so far as its resources are concerned. Take Shendun for instance. There is more money in the mountain back of that town, which will be dug out and put annually into circulation than in any half dozen of the richest agricultural counties in America. The county of Craig is almost a *terra incognita*. It has mineral wealth enough to make a hundred millionaires in 10 years, and thousands of men will go to Craig within the next twelve-month without a dollar who will soon be independently rich. There are more opportunities for men of energy and nerve in all this new country than were ever offered in any other that Anglo-Saxon pluck has ever opened up. Even in Roanoke city the cream has not been more than broken—there are at least two more years of work for active skimmers. The fact is the real cream is just beginning to come to the surface. It has become the wonder of Virginia with virtually one railroad. In a short time it will have certainly another great through trunk line to the South, and the Baltimore & Ohio and possibly the Cumberland Valley from the North. It will then begin a new race—not to be merely a smart manufacturing town for its goal, but to be a great commercial mart,

So far as real estate speculation is concerned, the excitement at Roanoke will

within sixty days become so intense that men will topple over in the streets with paralysis, paresis and every other kind of "esis" resulting from brains continually kept at white heat by the unquenchable fire of avarice. Nor has there even so far been a "boom," which so many new things will combine actively to sustain. The uncertainty about the Roanoke & Southern Railroad has for a long time kept down speculation. Since that enormous factor in the city's future has been actually let to contract, purchases have been made at so-called high prices, which will directly form the foundation for what will sound like fairy tales of quick-found wealth, like the creations of Aladdin's lamp. Then the B. & O. from Lexington to Salem and Roanoke will some fine day be let to contract, when values will quadruple before sun-down. Such a railroad center being thus past peradventure established, gigantic development companies will in quick succession be announced, all of which will add fuel to the flame of speculation.

The money made in this way will soon begin to go into great buildings, just as it did at Kansas City.

The opening of hundreds of mines, the building of hundreds of little manufacturing towns, will make Roanoke a distributing point which will attract scores of great wholesale houses, and by the bye, queerly enough, the future natural wholesale center of the city has up to this time been but little emphasized. According to the judgment of experts it will be just above and just below the junction of the Roanoke & Southern and the Norfolk & Western, close to the freight depot of the former, which will be the great highway to North Carolina and to the trade not only of the eastern slope of the Blue Ridge, but of all the Atlantic cotton country.

The scores of great manufactories, which will be located at this meeting place of coal and coke with pig iron and marble and timber and everything, in short, in the way of raw material, will supply an area of enormous magnitude, and along with the commodities these plants will ship there will go many thousand tons of merchandise from the great warehouses, which will soon inevitably be located here.

The real center of the city will be the Roanoke Southern depots. Around this point the speculation will soon be wild. True, on one side is a lovely knoll, intended by nature for a breathing ground, a mid-city park, like Boston Common, nevertheless, its proximity to the center of the city will cause its slopes to be leveled, its glorious forests to be uprooted, to make room for business. Its very top though commanding views, fit for the eyes of them who dwell in palaces, will soon be built over with hotels, of which there must needs be within a year three times as many as the town now has, although in this respect it is already the best equipped place of its size in all the United States.

A moment ago I spoke of Kansas City as a prototype of Roanoke. That wonderful place was predicated purely on agricultural development. Kansas had a rich soil and was being rapidly settled. Railroads were being built to carry Kansas City's "goods, wares and merchandise" to the people of the prairies. To every clear-headed man it was apparent that a big city was to be built there. Although St. Joseph had the start, Kansas City had what the Western people called the "git up and git." Her leading men believed in Kansas City, and backed their belief with their money.

A gentleman who was very actively identified with Kansas City for many years visited Roanoke with me a few days ago. After spending half a day with him seeing the town and meeting the people, I discerned that some sort of powerful impression had been made. "What are you most impressed with?" I asked. "Is it the great railroad shops, the furnaces, the half-dozen

banks —?" "No," said he, cutting off my questioning, "I am simply dumbfounded at the marvelous similarity between the atmosphere of Roanoke to-day and that of Kansas City the day I landed there in 1882. The same crowded incoming trains, the same rush on the streets, the same glorification of their own town by everybody, from bankers to bootblacks, the same apparently neglected localities in the heart of the city, the same prospect for many railroads, the same unusual percentage of brainy workers—the kind of men that made Kansas City." "But," he went on to say, "these people, enthusiastic as they are, do not realize what they've got. Roanoke to-day has better prospects than Kansas City ever had, and its rate of growth will exceed that of Kansas City not only relatively but absolutely. There will be 100,000 people here in ten years, 300,000 in twenty years; for aside from the population which her pay-rolls will sustain, the development of the immediately tributary territory will make a commerce (which was Kansas City's only expectation) as great as the entire State of Kansas has made."

Progress of Dallas.

DALLAS, TEXAS, Sept. 18, 1890.
Editor Manufacturers' Record:

Notwithstanding a widespread complaint of stringency of the money market and the usual laxity of business which comes with every summer, Dallas continues to add strength to her sinews of growth, and her business men are preparing for the largest volume of commercial transactions yet known in her history. Another national bank has been added to her already splendid money-handling facilities, and new money-lending institutions are continually establishing offices in Dallas with a view of occupying the magnificent territory that is gradually developing. Building is active. It is announced reliably that within the next sixty days work will begin on the buildings for the North Dallas Cotton Mills of 30,000 spindles. These mills will call for the immediate erection of about one hundred cottages for houses for the 500 operatives who will be employed by this new industry, which, however, is by no means an experiment in Dallas. The South Dallas Cotton Mills, organized in 1887, were the pioneer mills of Dallas, and such success has met the efforts of this enterprise that it has been unable to fill the orders for its product, which is sold not only throughout the vast empire of Texas, but in adjoining States and Territories. In addition to these two fabric and weaving mills, another mill is being erected in South Dallas which will not manufacture the fabric, but it will be confined to weaving exclusively. These mills, it is thought, will be followed by others. Dallas is in the heart of that fertile territory producing one-half of the cotton crop of the State; cheap coal of good quality is also within easy reach in unlimited quantity, and transportation facilities are adequate to all present demands. There is nothing of a permanent character here to retard the growth of manufacturing. Upon the other hand, this class of industry has a very promising outlook in Dallas. All classes of stock in manufacturing establishments pay a handsome dividend. Stock in the Manufacturers' Aid & Improvement Co., which organized several months ago to aid and build up manufactories by donating free sites, giving houses and taking stock, is hard to get at any price.

Great preparations are under way at present on account of the Texas State Fair and Dallas Exposition, which opens October 18 and closes November 2. This is always an event in which the people of the entire State take an active interest, and this year it is attracting the attention of many people from abroad.

GENERAL NOTES.

THE reorganization of the State Newspaper Co., of Richmond, has called forth many complimentary expressions from the press of the country. While there is unfeigned sorrow at the loss of Richard F. Beirne to journalism on account of ill health, the people of Richmond are to be congratulated on having a paper conducted by men of such journalistic ability and experience as those who succeed him. The State has long been one of the best afternoon papers in the South. Indeed there are few that can compare with it in enterprise, pluck and fairness. It was one of the pioneers in Virginia to recognize the wonderful industrial possibilities of that State, and to its tireless work must be attributed much of the prosperity that started up in 1886, and that has continued ever since. Mr. William Ryan, the president of the reorganized company, has been on the writing staff of the State for 12 or 14 years. He has been associate editor, and, in the absence of Mr. Beirne, acting editor. Mr. W. W. Archer, the vice-president of the company, has been on the State staff for 12 years. He has been one of the editorial writers since 1885, and has often distinguished himself by his journalistic and literary feats. Mr. E. B. Chesterman, the secretary, is one of the best special correspondents in Virginia. These three gentlemen own the greater part of the stock of the company. They have the advantage of being good business men in addition to their newspaper accomplishments. Mr. John M. Price is treasurer and business manager of the State. It is encouraging to know that legitimate enterprise like this of the State newspaper is appreciated in a substantial way by the Virginia public.

THE statement is made that parties interested in the American Steel Barge Co., of Duluth, Minn., have purchased a controlling interest in the Spanish-American Iron Co., and will run barges from Mobile to its iron property in Cuba. This property consists of 3,000 acres of ore land, which it will develop as rapidly as possible, making the heaviest shipments to Mobile, which will necessarily become the distributing point of the South for these ores.

AT Nashville, W. H. Silberhorn, A. S. Garretson and others have applied for a charter for the Nashville Packing Co. with a capital stock of \$1,000,000. It is the company's intention to erect an immense packing-house and abattoir with cold air basements on a tract of land purchased in the western section of the city, and the plant, when in full operation, will have an annual capacity of 600,000 hogs, 75,000 cattle and 75,000 sheep. The establishment will be the largest of its kind in the Southern States.

THE lumbering interests of the Southern States have kept pace within the past year with other interests. The overflow of the Mississippi was the highest ever known and the first for six years, and gave an opportunity for floating to the mills those logs which have been accumulating during that time. Those parishes of Louisiana which have had their crops damaged by the flood have been enabled to more than retrieve their losses by the gain in the amount of timber sold. The combined woodlands of the South have a total acreage of 196,832,000, which is about 41 per cent. of its total area, while the North and West together have only about 16 per cent. of their total area in woodlands. Western lumbermen have investigated Southern timber lands with the result that immense tracts have been purchased to be held for future development when their Western lands have been exhausted. The overflow has also given the Mobile mills,

which manufacture cypress shingles and lumber principally, an opportunity to procure an ample supply of cypress, the supply of which has been expected to be very short. Mexico, the West Indies, Central and South America have steadily increased their consumption of Southern timber for some years.

ANOTHER substitute for jute bagging has appeared, this time patented by Mr. C. B. Warrand, of Savannah, Ga. It is the saw palmetto, and in Alabama, South Carolina, Georgia and Florida it grows abundantly. Mr. Warrand claims that his palmetto fibre must take the place of jute, as it is cheaper and much superior to it. Specimens of the saw palmetto's different fibrous products have been exhibited, together with a sample of paper manufactured from it and a sample of tannic acid extracted from the stem, which, it is claimed, will tan leather in from one to two months less time than the ordinary oak bark. Mr. Warrand proposes to organize a \$50,000 stock company for the purpose of erecting an experimental plant in Savannah to give his patent a thorough test, and if successful, doubtless many other factories will spring up to prepare the fibre for the market.

AN application has been filed at Knoxville for the incorporation of the East Tennessee Navigation Co. It is the intention of the originators of the scheme to put a fleet of steamers upon the Tennessee river and do a general freight and passenger business. The boats will be run to highest navigable point of the river and as far down as Florence, Ala. The gentlemen are from Norfolk, Va., and represent a large amount of capital. Knoxville will be their headquarters. A prominent local attorney is looking after their interests at present.

SAVANNAH, GA., is now having some rosy visions of direct trade with Europe. The organization of a land investment company on an immense scale has been suggested to combine with the South's great railroad systems and the proposed Transatlantic Steamship Co. The immigrants, who generally bring ready money with them, could certainly be as easily induced to settle in the South as in the West. It has been suggested that possibly the Central Railroad would oppose this plan, as it would lose some of the trade which now goes by its ships to New York and thence to Europe; but this loss would be more than overbalanced by the increased traffic which the road would gain with the West. Wilmington Island, 10 miles southeast of Savannah, is being investigated as a new water terminal by the Macon & Atlantic Railroad. The island has a deep-water front and would suit this purpose admirably.

THE present issue of the stock of the Grottoes Co., of Shendun, Va., 15,000 shares, has all been placed, and the drawing and allotment of business lots will take place Wednesday, October 15, 1890, having been postponed from October 8 as first announced. There will be a sale of lots held immediately after the drawing. A contract has recently been closed by this company for the construction of a street car line 3 miles long at Shendun, the line to be completed and running in 30 days.

THE Tennessee Industrial Land Co., comprised of Chicago parties, has purchased, through W. Englewood, 1,000 acres of land at Dayton, Tenn., for \$316,500. It includes coal, iron and other mineral property, and the company intends expending a considerable amount on improvements. The building of a dummy line around the city and the construction of an electrical railroad are among the projects on hand.

THE MISSISSIPPI RIVER.

[Written for the MANUFACTURERS' RECORD.]

When Europeans began to settle the country of the lower Mississippi, one of their first measures for self-protection was the construction of levees. But for them New Orleans would never have been, and all the fertile regions of Mississippi and Louisiana would have remained a wilderness unto this day. Every year when the Northern snows melted, the Northern ice dissolved and the spring rains filled the hundreds of smaller tributaries to overflowing, the people of the Delta watched with keen anxiety for the coming of the mighty flood, never knowing whether it would overflow or break through the earthen wall; they had reared and carry death and destruction to their homes and their possessions. Among the many devastating floods of the eighteenth and nineteenth centuries there are records showing that those of 1735, '70, '82 and '96, and of 1811, '13, '23, '24, '28, '36 and '74 were much higher than that of 1882, as was also that of this year. But all of them were fearful visitations, causing untold privations and suffering, and great losses of life and property.

In January, 1874, Hon. J. Hale Sypher, then a member of Congress from Louisiana, spoke in favor of assisting the people to reconstruct their levees, and stated that up to that time Louisiana alone had, in the course of years, expended more than \$8,000,000 to maintain those within her borders. In the favorable report accompanying the bill then before Congress, the expanse of territory exposed to inundations was given as follows:

"The delta of the Mississippi with its head near Cape Girardeau, in Missouri, sweeps across nine and a-half degrees, from $37^{\circ} 30'$ to 29° of north latitude, and contains about 38,706 square miles of area, while the Red river contains in her alluvium about 1,887 miles, and the Arkansas about 500 miles, liable to inundation unless protected by levees. Thus we find the aggregate alluvial area of the Mississippi and cognate alluvions dependent upon levees for protection against inundation about 41,193 square miles."

Here are 26,000,000 acres of land, equaling in fertility any like and known to civilization, which for more than two centuries have been kept habitable only by the unceasing watchfulness and the vast expenditures of a relatively small population.

Last spring Gen. J. H. Rice, a citizen of Fort Scott, Kansas, well known in financial centers, who has large railroad interests in the Delta, wrote a letter to Gen. Charles H. Grosvenor, an Ohio member of Congress, dated Natchez, Miss., April 21, 1890, relative to the suffering of the people and the losses to property-owners because of the overflow. Of these he said:

"Ten miles of my completed road and thirty-odd miles of road-bed are under water. The Mississippi Valley Railroad is washed out in half a dozen places; travel and mails suspended. Twenty-odd miles of the Illinois Central Railroad are under water, and all travel and mails suspended. The track of the Vicksburg, Shreveport & Pacific Railroad is under water; also the Houston, Louisiana & Central Arkansas Railroad. Over 1,400 square miles of the most fertile land (alluvial) in the world is under water; thousands penned in their homes, stock drowned, and the suffering and loss is inconceivable.

Could the assembled Congress stand on the banks of this river here and see the courage and energy of these people—white as well as black—in the battle they are waging against the water, it would challenge their admiration and pity. The water stands from 6 to 18 feet above their farms and homes and all they hold dear,

and for miles and miles only from 1 to 6 inches of the softened top of the levee is between them and destruction. And for three weeks, day and night, in mud and water, have these men struggled to hold their levees with as fierce a purpose as ever men fought in battle; their families and household goods in the rear, their safety depending upon the courage, strength and labor of their husbands, sons and brothers.

The critical time has come. If God in His wisdom does not withhold the rain and storm miles of levee must go in the next 48 hours. Even then their fate is doubtful."

God did not "withhold the rain and storm," but He did bless the human agencies that had been employed, and when the flood had subsided and careful examinations were made, it was found that, although this was the greatest flood that has occurred since men began to keep records of them, yet the levees, the revetted banks and spar dams had proved their value as defensive works, and had fully justified the wisdom of their designers and the skill and integrity of their builders. This fact is fully established by the statistics contained in the report made by a committee of eminent engineers April 30, 1890, to the Mississippi Improvement and Levee Convention at Vicksburg. They said that in 1882 the total number of crevasses, caused by the flood of that year, was 284, aggregating 569 10 miles in width. In 1883 the crevasses numbered 224, with an aggregate width of 34 and 1-100 miles, and in 1884 there were 204 crevasses, aggregating 106 and 4-100 miles; and in every one of these three years there was a general overflow of the Mississippi delta. Last spring the number of crevasses was but 23, aggregating only 4 1/4 miles in width in a total length of 1,100 miles of levees, although the flood was higher than any other, and exceeded them in duration.

Major B. M. Harrod, formerly State Engineer of Louisiana, but since 1879 a member of the Mississippi River Commission, confirmed this statement in his evidence before the committee of the United States Senate, saying:

"The general result of this flood in the minds of everybody down there is that it has been a great levee victory. Of course the planters—the farmers—have looked at it from the standpoint of the incidental benefits they get. The engineers have looked at it from the standpoints of the improvements in the channel; but the conclusions that we have arrived at down there, the 15 or 16 engineers, for instance, who signed that Vicksburg report, is that this flood, the largest on record, has proved the economy and the practicability of the levee system; that it is practicable and cheap."

Prior to the organization of the Mississippi River Commission, the cost of constructing and maintaining levees was borne exclusively by the States that required protection. Since 1882 the cost has been divided between them and the general government. The legislatures of Louisiana, Mississippi and Arkansas have divided these States into levee districts. These are in charge of corporate boards, which are empowered to lay and collect such taxes as are required. "In many of these districts," said General Rice in the letter heretofore noticed, "a tax is made of from 5 to 15 cents an acre on land, 50 cents to \$1 a bale on cotton, and from 5 to 15 mills on all taxable property. With this tax, from year to year, have most of the present levees been built. This is a very onerous tax, and yet it will not raise one-half the sum required."

Since 1866 Louisiana has spent upon her levees \$15,255,327.13, of which about \$5,000,000 has been raised by her levee boards since 1882. The Mississippi boards have during the past eight years furnished \$3,098,745.74. And from the funds of the Mississippi River Commission \$3,018,601

have been applied to levee purposes. Arkansas has also expended considerable sums for the same purpose. That the people of the Delta have cheerfully paid these defensive taxes, and are ready and willing to continue them, was affirmed at the Vicksburg convention last spring by the unanimous adoption of the following preamble and resolution:

"WHEREAS: The duty and obligation is imposed by the Constitution upon the Federal Government of controlling and regulating commerce among the States, and the jurisdiction is also given it over the navigable waters of the country, and, on the lower Mississippi, under its constitutional direction, the construction and maintenance of levees has been adopted as a means of flood confinement and navigation improvement. This flood confinement and navigation improvement therefore subserves a dual purpose, to wit: Improvement of navigation and reclamation of the Mississippi Delta. In view of this fact, their cost and control has been in the past divided between the general government and the levee authorities of the various levee districts in the lower Mississippi Valley. This principle of co-operation in the work of levee building, recognizing a community of interests between the United States Government and the people of the Delta, which has been inaugurated by the Mississippi River Commission, and gives practical effect in the distribution of funds for this work, received the endorsement of President Arthur in his special message to Congress during 1883, and has recently received the emphatic approval of his excellency, President Harrison. In the light of nine years' experience, the Mississippi River Commission and the United States engineers jointly in charge of the work have affirmed their faith in the plan by the tests of results and success.

Therefore, We, the people of the Mississippi Valley, in convention assembled, interested in the ultimate success of this work in both of its phases, now reaffirm our faith in this plan and express our willingness to continue in the future to pay our fair share of the expense of building and maintaining said levees, and through our levee organizations, to co-operate with the Mississippi River Commission."

This is not only remarkable proof of the confidence inspired by the good work of the commission, but is also an example of genuine American pluck and patriotism, for "the Mississippi river and valley are the receptacle and channel to the sea for the entire drainage of twenty-five States and territories between the Alleghanies and the Rocky mountains. This drainage is each successive year precipitated into this channel more rapidly by reason of the changed and changing settlement and cultivation of many States about the headwaters."

When it is remembered that the representatives of the people of the Delta have cheerfully voted for appropriations from the public treasury for improvements of the rivers and harbors of the Atlantic, Pacific and Lake States, and at the same time have taxed themselves without stint to protect themselves from inundating waters that gathered their forces in other States and territories, this action of theirs rises to a dignity of which every American has reason to be proud.

If you desire to purchase machinery of any kind consult our advertising columns, and if you cannot find just what you wish, send us particulars as to the kind of machinery needed. We will make your wants known free of cost, and in this way secure the attention of machinery manufacturers throughout the country. You will thus get all information desired as to prices, etc.

Encourage Railroad Building.

The MANUFACTURERS' RECORD has repeatedly warned the people of the South against anti-railroad legislation at a time when development hinges on railroad building. Several times we animadverted on the craze for railroad regulation which swept over Texas. In their desire to get a whack at the railroad companies and discipline them for real or fancied wrongs, the farmers of that State would sacrifice their true interests. The effect of their crusade is pointed out in the following utterance of Mr. Jay Gould:

There is not much railroad building going on now. People who have railroad enterprises find it hard to raise money for them, and therefore excessive construction need not be feared. There will not be much railroad building as long as the imatical legislation continues. I was asked to build some branch lines in Texas. When I talked with people who previously had promptly invested in such enterprises, they declined to advance money on account of the fear of adverse legislation. The situation is the same in Iowa.

This is the natural and inevitable result of undue warfare on railroads. No sensible capitalist will jeopardize his money by putting it in an investment which can be made a plaything of by misguided farmers and mischievous demagogues. The railroad development of the South is largely in the future, and Texas and all the other States can well afford to pocket their comparatively small grievances for the time being. The South should be made especially attractive to railroad capitalists. It will cost vastly more than it comes to for Texas to antagonize railroad capital at this time, because what is saved in charges will be but a trifles compared to the loss and hindrance to development by stagnation in railroad building, besides the tax the people will ultimately be compelled to vote on themselves in the shape of bonds in order to secure new railroads. It will be time enough to discipline the railroads after all that are wanted have been built.

THAT beautiful Maryland city, Hagerstown, is enjoying the greatest activity and growth it has ever experienced. The naturally conservative citizens have been thoroughly aroused by the successful operations of a company organized last February, and the people are now united and enthusiastic in the work of building up their town. Hagerstown possesses very great attractions and advantages as a place of residence, besides very great resources in minerals and agriculture, is a railroad center, and with her nine turnpikes furnishes a market for one of the garden spots of the earth. Since the company began its work a number of new industries have been located, some of which are already in successful operation. At the first sale, held in June, \$17,000 worth of lots were sold, and these have doubled in value. Another sale is announced for October 21st, 22d and 23d.

GOSHEN, VA.

How Commodore Maury's Prediction That Goshen Would Be the Iron Center of America Is Being Fulfilled.

A Great Auction Sale of Lots at This Gateway City Between Virginia and West Virginia on October 9 and 10.

Mr. Ingalls, the President of the C. & O. Railway, One of the Directors in a Board Embracing Such Men as Governor Fleming, of West Virginia, and Other Influential Names.

What General Passenger Agent Fuller Says of the Palace Hotel at Goshen.

A GREAT OPPORTUNITY.

[Special Cor. MANUFACTURERS' RECORD.]

GOSHEN, ON THE C. & O.,
ROCKBRIDGE COUNTY, Sept. 19, 1890.

It is said that 30 years ago Commodore Maury, that wonderful Virginian, everywhere as deep-sea sounder and author of the standard physical geography of the world, gave it as his opinion that this very spot here in the northern corner of the old, old county of Rockbridge, upon which is being builded the new industrial city of Goshen, would some day, in the providence of God, become the iron center of the American continent. And the dying words of Commodore Maury were "carry me through Goshen Pass when the laurel is in bloom." Afterwards, when his remains were disinterred for removal from Lexington, it was in consonance with this, his dying wish, that the casket was actually carried while on its way to a final resting place, through what has just been named Maury avenue—the chief thoroughfare of the coming iron center—past the huge Victoria furnace, in sight of an enormous rolling mill, now being rapidly constructed, close to the site of a plant where nearly 400 men will make iron tubing, and as close to other industries, already contracted for, which will conjointly give employment to over 1,000 workmen.

Although I knew that Governor Lee's Pittsburgh & Atlanta Railroad would probably cross the Chesapeake & Ohio at this natural gateway between a rich mineral region in West Virginia and nearly all the rapidly growing new towns of the mother State, nevertheless I was astonished at what I have seen here to-day. The wonder of it is how such substantial acquisitions could have been procured with so little ado—how such extraordinary progress could have been made in so short a time. My conviction, however, is that the industrial growth of Virginia will, within the next 12 months, surprise all the world much more than I was surprised here at Goshen to-day.

And right here it is pertinent to quote a paragraph from the pen of that gifted Virginia writer, Mr. H. C. Tinsley, of the Staunton Vindicator, which is in harmony with the teachings of the MANUFACTURERS' RECORD during the last few years. Under the heading "A Pennsylvanian's View of the Future of Goshen," Mr. Tinsley says:

"I have already expressed my opinion about the successful future that is before the new city of Goshen, but I would like to give you the opinion of an old Pennsylvanian in the iron business, that I met here. I asked him if he thought there were too many towns building in Virginia, and if they were too close to each other to thrive. His reply was so quaint and characteristic that I give it: 'You Virginians,' he said, 'are new to the business and you are shy. You don't begin to know what

you've got. You are like flies that have been walking around the top of a sugar hogshead for a century and didn't know what was under it. And some of you are like flies that have found a crack in the top and think that the sugar they can see through it is all there is. There is room on top of your Virginia hogshead for 500 towns, and as to building too close, look at the Conemaugh valley. Take a stretch like Johnstown, Cambria City, Conemaugh and the rest, where street car lines connect them. You Virginia men are making your first appearance, and you get stage fright too easy. You forget what is under you, and think that your boom is on the Western wildcat order, where they put a town on prairie land with nothing under it and 'boom' it on what comes out of the freight depot. This Goshen town is built on lime rock and fenced in with iron mines, and if you live ten years you'll see those fellows that are loading those wagons now, putting up \$5,000 houses for themselves. Things go fast in new manufacturing towns. I've been all along there and seen the changes they make. If you Virginians let land gambling alone you've got the thing in your own hands. Never put a dollar in where there ain't going to be work done. I am too old now to move my people down to Virginia, but I am going to put something in the lots here when they put 'em up. But if I hadn't seen the bosses building rolling mills and factories and going into manufactures they'd never see a dollar of my money. In five years this town ought to be manufacturing everything that is made of iron that ain't tied up by a patent, and you'll see it."

As I said a moment ago, it struck me as wonderful how the existing substantialities here had been brought about so noiselessly, for, as a rule, town companies—and very naturally, as the world goes—do an immense amount of hurrahing over really insignificant additions to their population-making enterprise. The secret of the surprising prospect for pay-rolls at Goshen is one which, in a measure, exemplifies the idea of a certain friend of mine who declared that with the right men behind him and with money enough, he would undertake to build a big city in the center of the Sahara desert. That is to say, when Mr. C. P. Ehrman and his associates inaugurated this enterprise, they sought and secured as their allies men with sufficient influence and money, and, best of all, familiarity with industrial ways and means to guarantee success, provided they had made no mistake in picking out the point to be improved. In other words, they had "a little list," and all that was needed was to prove the fitness of the location to secure the full, cordial, energetic co-operation of men who could do anything they wanted to do. Concerning the men brought together in the organization of the Goshen Land & Improvement Co., I shall have a word to say directly. Right now let us take a look at the location.

Mr. Ehrman, who had come up to Virginia from Birmingham—and make a note of it that men of sagacity are coming to Virginia from the South and West, as well as from the North—argued somewhat in this wise: "The Chesapeake & Ohio is the great artery from East to West of the Appalachian region. There is going to be another great North and South artery through the same region. Wherever these two meet—provided other things are equal—that will be the place where a pretty decent town will grow up spontaneously; but if the advantages of that location be pushed by a powerful organization, instead of a moderate town, a big city can be created. Again, there are two or three West Virginia railroads working southward. The great coalfields now fully exploited in Pocahontas and Randolph counties indicate that both the Camden crowd and the Davis people will work in that direction. Once

so close to the Chesapeake & Ohio (some 35 miles), they will build to any junctional town that may be pushed, provided topographical conditions are favorable. The shortest and best route for General Lee's Pittsburgh & Virginia Railroad is by way of Goshen. The grades from the coal fields of Pocahontas and Randolph counties, toward which the Camden and Davis railroads are now rapidly working are easy to Goshen. Therefore, the chances are that Goshen is the site of the future city between Roanoke, Va., and Pittsburgh, Pa.

From the very outset, it is but right to say, Mr. J. Fred Effinger and Mr. C. L. Cooke, of Staunton, Va., were associated with Mr. C. P. Ehrman. And, by the bye, the number of brainy men that Staunton has furnished for promoting the prosperity of other towns is larger than any city of the same size in America can show. Nevertheless, Staunton will "get there" herself some of these fine days. Well, Effinger, Cooke and Ehrman reasoned together in coming to the conclusion that Goshen was the place. The next man taken in was Col. R. P. Chew, of Charleston, W. Va., a man with a great following. Then the Hon. A. B. Fleming, now governor of West Virginia, was admitted to the syndicate, and various others of more or less influence, wealth and position, so that when the company came to be finally organized it was possible to elect the following singularly powerful board of directors: M. E. Ingalls, president of the Chesapeake & Ohio Railway Co.; Governor Fleming, Gen. C. H. Smyth, New York; Nelson Thomasson, Chicago; Franklin Osborne, Pittsburgh, Pa.; Major Holmes Conrad, Winchester, Va., and the first four named, viz., C. P. Ehrman, Charles L. Cooke, J. Fred Effinger and Col. Chew.

Mr. Ingalls, as everyone knows, is providing a tremendous lever for the development of the region traversed by the Chesapeake & Ohio. This, however, is in strict consistency with a conscientious and sagacious fulfillment of his trust. The Chesapeake & Ohio will be the gainer. It is traffic that makes dividends; and the creation of traffic is the one thing needful to every railroad traversing an undeveloped country. At its present rate of activity in developing resources a year or two will suffice to make this road, which for years was a non-dividend payer, one of the most profitable properties in the country.

Speaking of the Chesapeake & Ohio makes appropriate here a word about the magnificent "Palace Hotel" now in course of construction on the elevated plateau just south of the present passenger depot at Goshen—a plateau commanding a view that has few equals in all this region of incomparable natural grandeur. This hotel was the suggestion either of Mr. Ingalls or of Mr. H. W. Fuller, the able general passenger agent of the Chesapeake & Ohio. The constant traveler between Cincinnati or Louisville and the East over this now superbly equipped line will remember that there is nowhere between the Ohio river cities and Old Point such a thing as a first-class resting place except at the White Sulphur, which, except in summer time, is closed. And the self-same traveler will also be thinking of how, while passing through the sorcerous scenery of this region, he has time and again wished that there had been provided some comfortable hospitality where for a day or two he might get himself aesthetically drunk upon the enchanting views which mother nature has here provided in such profound profusion.

Said the Chesapeake & Ohio people, "Goshen is the place for a glorious hotel." Said Mr. Fuller, so soon as the plan of my friend Yarnall, the great Philadelphia poet-architect (all his creations are poetical) were shown him, "I will enjoy the sensation of advertising such a modern hostelry on the line of our road."

This dream of beauty, in the way of a

140-room hotel, is now being built by R. C. Ballinger & Co., noted Philadelphia contractors. I am sorry I havn't a cut to show its graceful contour exemplifying the antique French chateau. One of its novelties will be an ever flowing stream of strong sulphur water, brought by gravitation into perpetual motion, from the famous Cold Sulphur Springs. The Goshen "Palace" will not be built in the cheap shanty manner so much in vogue at booming towns, but in stone and pressed brick, with interior decorations of the most exquisite kind. Eighteen or nineteen years ago I first made acquaintance with Goshen and ate a villainous supper at a rattle-trap old inn before taking the stage for a 16 mile night ride to Lexington, where I was a student at Washington and Lee. When to day I pictured the luxury of Yarnall's creation and contrasted the yesterday with the tomorrow, I decided to "even up things" by coming here and spending a week at the Palace just so soon as it shall be completed.

The foregoing has all been written on an impulse. Mr. Ehrman, the manager of the company, drove me out this morning as a matter of courtesy. After showing me the new streets and the new industries, and giving me an opportunity to breathe pure air and enjoy sublime scenery for several hours, he asked me to make a note of the fact that the company proposed to hold a grand auction sale of lots on Wednesday and Thursday, October 9 and 10. This sale will have one or two special peculiarities. It will be preceded by a larger number of secured industries than any opening sale ever held in a Southern town, and by reason of the organization of building companies under contract to construct at least two hundred thousand dollars' worth of houses, it will be one of the first opening sales where a real live town is guaranteed in advance.

In view of the abominable accommodations which the patrons of so many new town sales have had to put up with (although they have generally afterwards got well paid in profits on investments for their discomfort in this respect), it ought to be stated—and the statement will doubtless help to augment the crowd at Goshen on October 9 and 10—that the great hotel at Rockbridge, Alum Springs (which is within 20 minutes by rail) and the well kept hotel at Cold Sulphur Springs, which is within 10 minutes by bus, will both be thrown open to supply lodging and creature comforts to the bidders. Beside, the Commercial Hotel, now open here at the depot, is capable of caring for, in excellent style, several hundred visitors.

THOMAS P. GRASTY.

P. S.—Since writing the above, a gentleman who has just seen Hon. John R. Procter, recently returned from London, has informed me that Mr. Procter states that the building of the Pittsburgh & Virginia via Goshen is, as far as can be, absolutely assured.

THE FIRST NATIONAL BANK, }
ROCK HILL, S. C., Sept. 19, 1890. }

We are enjoying general prosperity. The cotton crop will be large, the corn excellent, other field products good, and the year altogether favorable to the agricultural interest. In progressiveness, prosperity and activity Rock Hill leads. Manufacturing industries are in a healthy condition, with a general disposition to increase plants. Additional capital would yield liberal returns. The general business is excellent, with good collections and an active cotton market. Iron ore of high grade has been discovered in quantity and its development commenced. At no time has the prosperity of this section been more general or the progress more marked.

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Here Are Found :

The finest Hematite Iron Ores in the South.

Extensive Manganese Deposits that experts from Pennsylvania and elsewhere believe to be the greatest in the United States.

Vast Forests of Fine Timber, Pine and many varieties of Hardwoods.

Never-failing Mountain Springs with a daily flow of many million gallons of the purest Freestone water, besides Sulphur, Chalybeate and other Mineral Springs.

A climate that has no superior for all the year; malaria is unknown, and the nights are cool even in midsummer.

A Fertile Agricultural Country, where cotton, grains, grasses, fruits and vegetables yield abundant crops, and where fine Jerseys wade knee-deep in clover.

A population of 3,000, churches of all denominations, excellent schools, charming society.

A National Bank, Water Works, Fine Hotel, &c.

Steel Works, to include Furnaces, Rolling Mill, Rail Mill, Cotton Tie Mill, &c., and to employ 3,000 hands, under construction.

A Cotton-Seed Oil Mill and Fertilizer Factory under construction.

For particulars address GOLDSMITH B. WEST, General Manager JACKSONVILLE MINING & MANUFACTURING COMPANY, Tredegar (Present Postoffice, Jacksonville), Alabama.

*An Unequalled Field for
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LAREDO, TEXAS.

The Gateway to and from the Republic of Mexico

Is nature's grand outlet for the manufactured products of the United States and nature's grand inlet for the mineral and raw products of Mexico. For the cheap delivery of the raw material necessary for the successful operation of iron and all textile industries, Laredo holds a position unsurpassed, every material being found in the immediate neighborhood. The very foundations of the city are upon inexhaustible coal beds, now being rapidly developed. A glance at the map will show that there are no large cities within hundreds of miles of Laredo, and her favorable geographical location, being from 600 to 800 miles nearer the trade centers of both republics than any other frontier port, stamps her as the commercial entrepot between the United States and Mexico.

Laredo is becoming a most important manufacturing point,

having the following industries already located and in operation:

- Woolen Mill.
- Wool Scouring Mill.
- Tannery.
- Boot and Shoe Factory.
- Ore Concentrating Works.
- Ore Sampling Works.
- Cotton Gin and Milling Works.
- Mineral Water Bottling Works.
- Four Ice Factories.
- General Car and Machine Shops of the Mexican National Railroad, the largest west of the Mississippi.
- Three Large Brick-yards and several smaller establishments.
- A large Cotton Factory is now being erected by a New England syndicate.

Laredo Offers to the Capitalist, Merchant, Manufacturer and Mechanic Opportunities for Investment, Business or Manufacturing such as no other City in the Southwest can offer.

The city is well supplied with railroad facilities and hotel accommodations, has Holly system of water works, two electric-light companies and one of the best equipped electric motor street railways in the United States.

| | Population. | Imports and Exports. |
|-----------|-------------|-----------------------|
| 1886..... | 3,000 | |
| 1888..... | 6,000 | 1888.....\$ 3,000,000 |
| 1889..... | 12,000 | 1889..... 10,543,000 |

For Maps, Pamphlets, Bird's Eye Views and Reliable Information of Laredo, address

THE LAREDO IMPROVEMENT CO.

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MARION COUNTY,

TENNESSEE.

KIMBALL TOWN COMPANY.

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OFFICES.
Richardson Building, Chattanooga.
Union Trust Building, So Broadway, New York.
Company's Building, Kimball, Tenn.

Kimball Offers

Solid, practical inducements to manufacturers. First-class enterprises under good management will be guaranteed, one-half the cash required. Local taxes will be remitted for a term of years. Lowest freights and cheapest raw materials will be secured.

Auxiliary Companies

will be organized by the parent corporation for developing the wealth of the Sequatchie Valley and for supplying the city with heat, light, water, power and transportation.

A Mammoth Industrial Building

will be erected by the Kimball Town Company, which will have power, light and heat, that will be supplied to manufacturers on the most liberal terms.

Ample provision made for religious and educational institutions.

No Further Auction Sales

this year and no private sales of the corporation's lots except to those who will contract to build immediately on plans approved by the management.

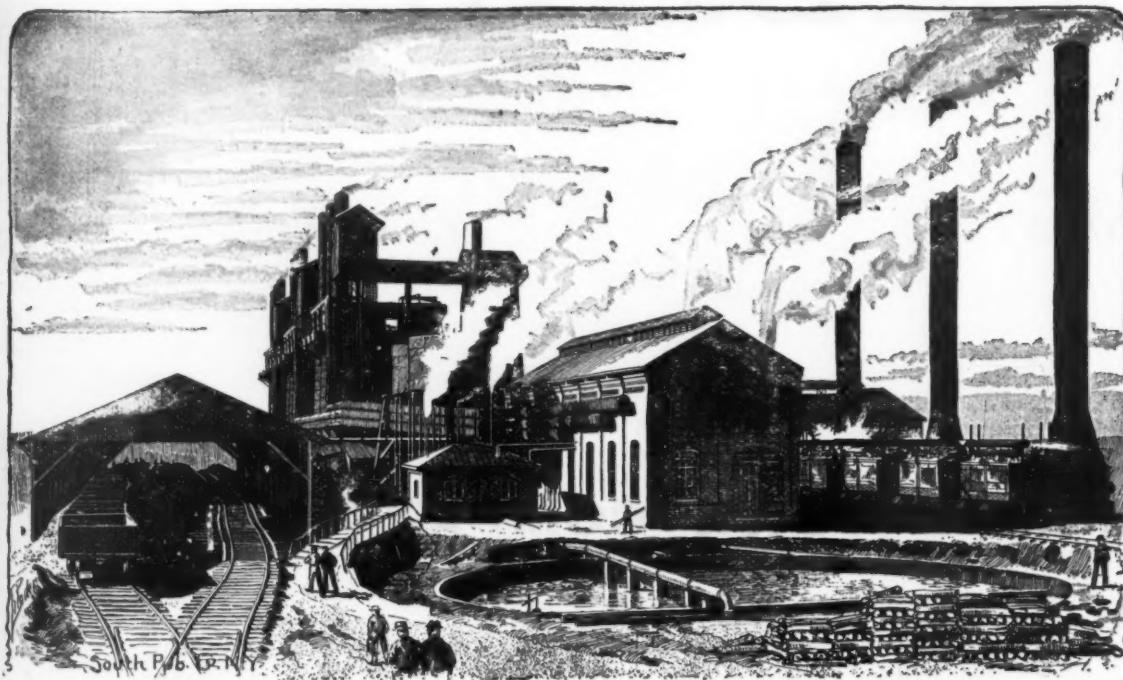
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H. I. KIMBALL, Managing Director,

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SHEFFIELD, ALA.

THE SUPERB.



The following are among the corporate and private enterprises that belong to Sheffield:

The Sheffield Land, Iron & Coal Co., capital \$1,000,000.
 The Sheffield & Birmingham Coal, Iron & Railroad Co., capital \$1,000,000; the owners of three 150-ton blast furnaces.
 The Birm., Sheffield & Tenna. River Railway Co., capital \$5,000,000.
 The Hattie Ensley Furnace, capital \$200,000.
 The Lady Ensley Furnace Co., capital \$200,000.
 The Electric Light & Gas Fuel Works, \$50,000.
 The Sheffield Ice Co., capital \$25,000.
 The Sheffield Manufacturing & Constructing Co., \$30,000.
 The Sheffield Contracting Co., \$30,000.
 The Eureka Brick & Lumber Co., \$30,000.
 The Howard Brick Co.
 The Sheffield Bakery & Bottling Works.
 The Sheffield Mineral Paint Co., capital \$50,000.
 The Sheffield Agricultural Works, capital \$40,000.
 The Sheffield Cotton Compress Co., \$60,000.
 Millan Brothers, Steam Laundry.
 Enterprise Publishing Co.
 Water Works, already expended, \$30,000.
 Sheffield Street Railway Co., capital \$100,000.
 Cleveland Hotel Co., capital \$50,000.
 Sheffield Hotel Co., capital \$120,000.
 Bank of Commerce, capital \$150,000.
 East Sheffield Land Co., capital \$500,000.
 Hull & Keller's Fern Quarries.
 Mobile Real Estate Co., capital \$50,000.
 Sheffield Real Estate Co., capital \$50,000.
 Sheffield & Mobile Improvement Co., capital \$100,000.
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 Globe Iron & Brass Works, capital \$10,000.
 Standard Machine Shop & Foundry, capital \$50,000.
 Owen Pink Mixture Co., capital \$100,000.
 Bell Telephone & Telegraph Co.
 Foulds' Shoe Factory, capital \$20,000.
 Enterprise Wood Working Co., capital \$30,000.
 Buchanan Straw Goods Factory, \$25,000.
 The Sheffield Harness & Saddlery Co., capital \$20,000.
 Principal Shops of the Sheffield & Birmingham Railroad.
 Principal Shops Memphis & Charleston Railroad, now being built.

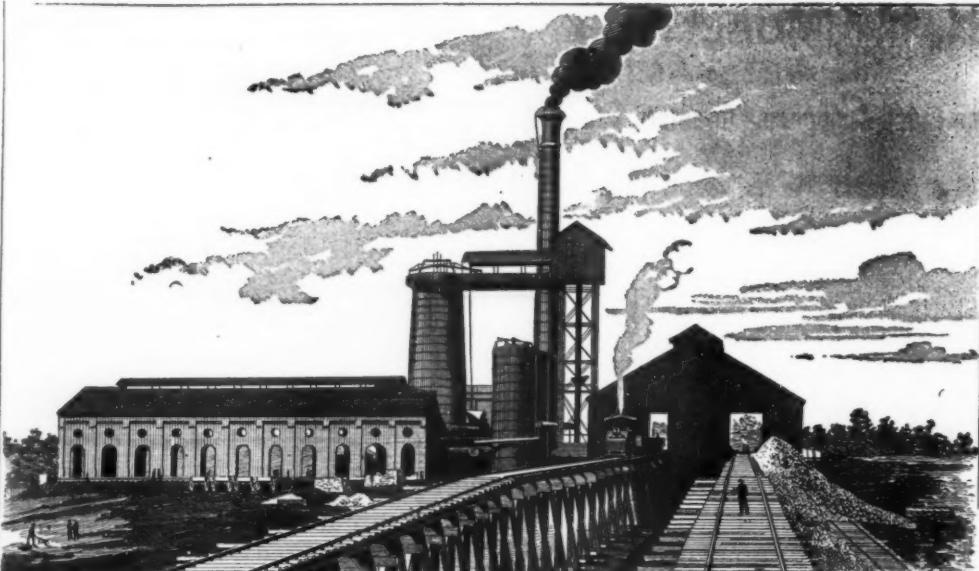
At the Headwaters of Deep Navigation on the Tennessee River, the Hudson of the South.

The Largest Producer of HIGH-GRADE Pig Iron of any City in the Entire Industrial South.

The only point in the South that has or can ship pig iron to the cities on the Mississippi, Missouri and Ohio rivers by boat or barge without rehandling. This last shipment of 5,000 tons of Pig Iron to Pittsburgh, Pa., by barge was made at a saving of \$2.65 per ton over what any iron-producing city of the South has done or can do to-day.

Five Large Blast Furnaces

Capacity 750 tons pig iron per day.



Aside from the foregoing the following are in course of construction and may be considered positive: Principal Shops of the Memphis & Charleston Railroad; Principal shops of the Nashville, Florence & Sheffield Division of the Louisville & Nashville Railroad. Reasonably certain to be secured in the near future are the following, in regard to which negotiations are pending: A Rolling Mill; Large Machine Shop; A Cotton Mill.

ALABAMA'S IRON CITY.

The Superb Location at the head of navigation on the Tennessee River, commanding the outlet to immense fields of IRON ORE and COAL and magnificent tracts of the finest Timber. Has already attracted to the spot where three years ago in a cotton field her projectors set the stakes of a new city, capital and people, unequalled in amount and number, circumstances considered, by any of the so-called new cities of the South.

With eight Church Organizations, two Free Public Schools, Postoffice, Telegraph and Express offices and abundant facilities of transportation by river and rail. It has every advantage as a residence city that can be desired.

Good Water; Drainage Excellent; Health and Climate Unsurpassed. Free Public Schools and Churches. Splendid opening for men of push and energy. No better point for profitable investment. No "Old Fogey" element here.

Sites for Manufacturing Enterprises

And for Free Public Schools and Churches

Donated by the Sheffield Land, Iron & Coal Company.

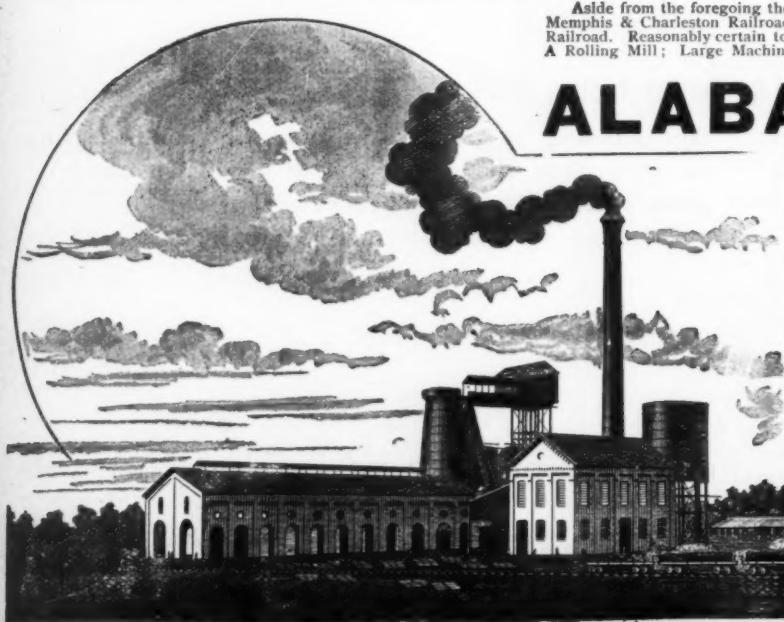
Printed information furnished on request. Correspondence solicited. Communications should be addressed

W. L. CHAMBERS,

Vice-President and Manager.

Sheffield Land, Iron & Coal Company,

SHEFFIELD, ALABAMA



The Staunton Development Co.

OF STAUNTON, VIRGINIA.

Authorized Capital \$2,000,000.

Shares \$100 par value each.

OFFICERS

M. ERSKINE MILLER, President, Staunton, Va.

S. M. YOST, Vice-President, Staunton, Va.

W. P. TAMS, Treasurer, Staunton, Va.

W. J. PERRY, Secretary, Staunton, Va.

DIRECTORS

ISAAC WITZ, Staunton, Va.

B. F. EAKLE, Staunton, Va.

JOHN MCQUAIDE, Staunton, Va.

ANDREW BOWLING, Staunton, Va.

S. M. YOST, Staunton, Va.

JED HOTCHKISS, Staunton, Va.

J. H. WAYT, Staunton, Va.

M. ERSKINE MILLER, Staunton, Va.

O. K. LAPHAM, Chicago, Ill.

H. H. FAY, Capitalist, 28 State Street,
Boston, Mass.

W. L. FLEMING, Richmond, Va.

GEORGE H. HULL, President American
Pig Iron Storage Warrant Company, 44
Wall Street, New York.

STAUNTON, VIRGINIA.

The Queen City of the Valley of Virginia.
Present Population 12,000.

Situated in Augusta county at the crossing of the Baltimore & Ohio and Chesapeake & Ohio railroads and accessible to the great coal and coke fields, namely: Connellsville, by the Baltimore & Ohio; Pocahontas or Flat Top by the Norfolk & Western and Chesapeake & Ohio, and New River Coke Fields by the Chesapeake & Ohio.

PROPERTY.

The lands acquired, aggregating 2,242 acres, more or less, are favorably situated within the city limits and adjoining the corporation lines, and it might be fairly said that about 240 acres are situated within the city of Staunton. The great bulk of the property lies between the Valley Railroad or Baltimore & Ohio Railroad and the Chesapeake & Ohio Railway, and is most admirably situated for railroad switches and side tracks to reach manufacturing enterprises. Several streams of good water run through the lands, affording abundant water supply for factories and fine drainage.

of which \$204,800 has been disposed of, leaving \$800,000 of stock in the treasury, to be hereafter issued, if it should be deemed wise to do so.

Subscribers will bear in mind that with every two shares of stock they will be entitled to either a business or residence lot, to be determined by a drawing at a date to be hereafter designated.

BOOKS OF SUBSCRIPTION NOW OPEN.

Staunton is within six hours' ride from Washington, seven of Baltimore, nine of Philadelphia and eleven of New York.

It has an excellent system of water works, paid fire department, electric light and gas companies, ice factory, street car line under construction, four newspapers, handsome opera house, commercial college and other important industries that contribute to the welfare of the city.

CAPITAL STOCK.

The authorized capital is two million dollars. One million, two hundred thousand dollars of stock will now be issued,

FOR SUCH INDUSTRIES AS

COTTON MILLS,
WOOLEN MILLS,
TANNERIES,
BOOT AND SHOE FACTORIES,
HARNESS AND SADDLE FACTORIES,
FURNITURE FACTORIES,
CARRIAGE AND WAGON FACTORIES,
FLOUR MILLS,
GRIST MILLS,
CRACKER FACTORIES,
CANNING FACTORIES,
COTTON-SEED OIL MILLS,

DALLAS, TEX.

Is equal to any locality
in America in its
combined advantages of
**CHEAP AND
ABUNDANT
RAW MATERIAL
READY,
PROFITABLE
AND EXPANDING
MARKET.**
DISTRIBUTING FACILITIES,
ELIGIBLE SITES,
GOOD CLIMATE.

Any worthy industries
will be aided liberally by the

DALLAS MANUFACTURERS' AID & IMPROVEMENT CO.

711 Main Street, Dallas, Texas.

BEDFORD CITY LAND & IMPROVEMENT CO.

BEDFORD CITY, LAT LIBERTY, VA.

By special act of the Legislature of Virginia the Bedford City Land & Improvement Company was chartered with the most liberal grants of power. The company has been fully organized.

AUTHORIZED CAPITAL - - - - \$1,000,000.

JAS. M. BERRY, (of Berry Bros., Tobacconists,) **President.**

R. B. CLAYTOR, (of R. B. Claytor & Co., Merchants) **Vice-President.**

J. LAWRENCE CAMPBELL, (of Burks & Campbell, Attorneys-at-Law,) **Secretary.**

S. M. BOLLING, (of Bolling, Wright & Co., Tobacconists,) **Treasurer.**

BOARD OF DIRECTORS:

| | | |
|-------------------------------------------------------|----------------------------------------------------------------------------|--------------|
| MARTIN P. BURKS, | R. B. CLAYTOR, | J. M. BERRY, |
| C. W. WHARTON, | J. LAWRENCE CAMPBELL, | T. D. BERRY, |
| S. M. BOLLING, | SAMUEL GRIFFIN, | W. W. BERRY, |
| DR. W. W. SMITH, President of Randolph-Macon College. | REV. A. E. DICKINSON, D. D., Editor of the Religious Herald, Richmond, Va. | |

The Company is solvent and its business is conducted on the soundest business principles. It is not engaged in wild booming.

Only \$300,000 worth of stock has been offered to the public.

The Company owns nearly 800 acres, containing the best residence, business and manufacturing sites. The stock which is offered is in ten-dollar shares, payable \$2 per share cash when subscribed, \$1 each thirty days thereafter, until \$5 is paid on the share. For this the Company issues paid up non-assessable certificates of stock. The money thus raised is to be applied to the improvement of the property.

Bedford City is not an old field, but a thrifty, growing community, in the most healthful and beautiful mountain region in Virginia.

Mean yearly temperature 53.7; Winter, 44; Summer, 78.

A few miles from the peaks of Otter, it would be difficult to exaggerate the exquisit beauty of the scenery and the tonic quality of the atmosphere. Within a days ride of Boston, New York, Philadelphia, and a few hours from Baltimore, it presents unusual advantages for health seekers.

The present population is nearly 4,000. There are 30 manufacturing enterprises, large and small, in operation, and 10 new secured with capital provided, which go into work as soon as buildings can be put up and the plants erected.

On the Company's lands are the elegant Randolph-Macon Academy, the largest school for boys in the South, and the Jeter Memorial Institute for young ladies, which will be commenced within six months. The Norfolk & Western R. R. Co. will build a fine passenger depot near a first-class hotel, to cost \$75,000. Poindexter, the architect of the Academy, is now preparing plans.

The Bedford City Company offers the most beautiful residence sites in the western part of the town, in which direction it is rapidly building.

This is the safest and best investment offered anywhere in Virginia. It is a golden opportunity to get property in a splendid section, as rich in minerals as it is healthful and magnificent in the grandeur of its mountains.

A new railroad from Glasgow to Atlanta will be built. Its construction will begin this year. For further particulars address

J. M. BERRY. President of Bedford City Land & Improvement Co., Bedford City, Va.

DENISON, TEXAS.

The "QUEEN" City of the Southwest,

— AND —

* GATEWAY *

— TO THE —

GREAT STATE OF TEXAS.

The City of Denison presents the Finest Opportunity of any City in the Southwest for the Investment of Capital in Large or Small Sums.

DENISON is situated in Northeastern Texas near inexhaustible beds of coal and iron, surrounded by the finest fruit lands in the world, and adjoining the INDIAN TERRITORY, which, in the nature of things, must in a few years be opened to settlement.

The growth of Dennison has been a natural one, the city having reached its present size—16,800 population—in sixteen years.

The city is regularly and beautifully laid out. Railroads run from it in four different directions. The Missouri, Kansas & Texas alone does an enormous business, having 54 miles of switch track in Denison, employing 500 skilled workmen and disbursing \$150,000 a month in wages.

The first public school in the State was established here, and the city's elegant two and three story brick school buildings, surrounded by attractive grounds, are well arranged for the use of the white and colored children. Its schools are in session ten months in each year.

We have sixteen church societies, seven of which are colored.

The city is well supplied with pure water from its numerous private wells—dug in the ground—and its first-class system of water works, giving the citizens ample protection against serious loss by fire, and enabling the insurance companies to rate the city first class as to fire hazard. Rate of taxation low.

The city has four miles of street railway, and a six-mile motor railway; has two electric light companies and a telephone plant. It has an influential New England colony, and counts among its citizens people from every State in the Union.

A large hotel, to cost \$125,000, is to be erected here this year, and a large steel plant with \$2,000,000 of capital is contemplated.

30,000 bales of cotton were shipped from Denison in 1889. 200,000 baskets of strawber-

ries and several carloads of peaches and other fruits have been shipped to market this season.

The Denison Canning Co., capitalized at \$100,000, has one of the largest canning factories in the country.

A cotton mill company with a capital of \$500,000 is building a 25,000-spindle cotton mill.

The climate of Denison is magnificent, situated nearly 800 feet above sea level. In summer it is warm, but far cooler than many cities farther North, and from 6 P. M. until after sunrise it is always cool. The city is very healthy.

The capacity of the ice factory has been increased from a daily output of 15 tons to 30.

The Denison Land & Investment Co. is prepared to give every reasonable encouragement to manufacturers, and solicit correspondence from such manufacturers as contemplate coming into the Southwest to locate.

Address all communications to

THE DENISON LAND & INVESTMENT COMPANY,

DENISON, TEXAS.

Paid-Up Capital, - - - - - \$1,200,000.

OFFICERS:

W. P. RICE, President.

MILTON H. FRENCH, Vice-President.

B. J. DERBY, General Manager.

ARTHUR L. BERRY, Secretary and Treasurer.

DIRECTORS:

W. P. RICE,
J. M. FORD,
SAM STAR,

Kansas City, Mo.
Kansas City, Mo.
Denison, Tex.

B. J. DERBY, Burlington, Vermont.
ARTHUR L. BERRY, Denison, Tex.
M. V. B. CHASE, Augusta, Maine.

MILTON H. FRENCH, Thomaston, Maine.
B. C. MURRAY, Denison, Texas.
JOS. B. LINCOLN, Boston, Mass.

* LURAY, * Virginia. *

2,500 Acres Town Lands,



8,000 Acres Mineral Lands,

Luray Inn and Caverns.

The Valley Land & Improvement Company,

Capital Stock, \$2,000,000.

Luray, Page County, Va.

DIRECTORS.

D. F. KAGEY, Luray, Va., President.

G. C. MARSHALL, Uniontown, Pa., Vice-President and General Manager.

T. E. McCORKLE, Lexington, Va.

DR. W. L. HUDSON, Luray, Va.

G. K. MULLIN, Philadelphia, Pa.

DR. A. M. HENKEL, Staunton, Va.

J. W. MILLER, Mount Jackson, Va.

EXECUTIVE COMMITTEE.

D. F. KAGEY.

G. C. MARSHALL.

T. E. McCORKLE.

G. K. MULLIN.

Secretary, T. E. McCORKLE.

Treasurer, H. M. KERR, Kagey & Co.'s Bank.

Attorney, T. E. McCORKLE.

Associate Counsel, H. J. SMOOT.

Manager of Inn and Caverns, G. K. MULLIN.

Bankers, D. F. KAGEY & CO., Luray, Va.

CHARTER, PROPERTIES, &c.

The Valley Land & Improvement Company has been organized under the most liberal charter ever granted by the State of Virginia.

2,500 acres for manufacturing purposes and building sites. These lands are in and around the hotel, caverns and town of Luray on an undulating plateau, protected on either side by the Massanutten Mountain and the Blue Ridge Mountains.

8,000 acres of the best mineral properties in Virginia, consisting of iron, manganese and other valuable minerals which have stood the test of examination by the ablest geologists of the country.

The company owns the celebrated Luray Inn and the Luray Caverns.

Page County stands at the head of the list as having a greater variety of minerals and richer than any other county so far as known in the State.

In addition we have the finest kind and a great variety of virgin timber and fire-clays, slates, beautiful marbles, ochres, umber and mineral paints.

LOCATION, RAILROADS, &c.

Luray, now a town of about 2,500, is the county seat of Page county, has five churches, splendid schools, fine stores, three newspapers, flouring mill, cigar factory, &c.

The town is on the Shenandoah Valley Railroad, of the Norfolk & Western system, and is the best location in Virginia, four hours from tidewater.

Two new lines projected connecting closely with Baltimore and Washington and insuring cheap freights.

Luray has largest tannery in the world, annual pay roll over \$350,000.

Inexhaustible water supply, agricultural resources, charming climate.

Fine natural sites for furnaces and manufactories of all kinds fronting the railroad, reserved by the company, which by donations of land and in every possible way will promote Luray's manufacturing interests.

LOTS, CAPITAL STOCK, &c.

Capital stock \$2,000,000, shares \$100.

One million of stock reserved in treasury for betterment.

One million now offered for sale.

Books open at the bank of D. F. Kagey & Co., Luray, Va.

The company reserves the right to close the books any time before the full amount of the one million is sold.

Twenty per cent. must be paid on subscription, 20 per cent in 30 days, the balance equally in six and twelve months.

When half of the subscription is paid in subscribers have the right to use their stock in payment on lot purchases.

The company feels safe in saying that with the magnificent property in hand, the Inn and Caverns, it will be enabled when thoroughly under way to pay four or five per cent. dividend on the stock sold, independent of lots and mineral lands.

The company already owns an electric plant which will be considerably enlarged.

Complete system of water works and many other improvements projected. Investors are referred to Mr. J. W. Wheeler, Cashier Drovers and Mechanics' National Bank, Baltimore, Md., for full information. H. C. Turnbull, Jr., real estate agent, 52 Lexington street, will receive subscriptions of stock in Baltimore.

The fullest investigation invited.

THE VALLEY LAND & IMPROVEMENT COMPANY, LURAY, PAGE COUNTY, VA.

COME and SEE
the Riches of
East Tennessee

LEAVING BOSTON SATURDAY AFTERNOON, OCTOBER 4th, ARRIVING IN CARDIFF MONDAY, OCTOBER 6th.

The visitors will have an opportunity for a stay of several days in

The Newest and Most Wonderful City of the South.

Further Particulars
Announced at
A Subsequent Date.

Grand Excursion
TO
CARDIFF,
TENNESSEE.

The Cardiff Coal & Iron Co.

WILL RUN AN EXCURSION FROM

NEW ENGLAND
TO CARDIFF,

On Saturday, October 4th, 1890,

Giving people a chance to see what has been done in a

FEW WEEKS IN BUILDING A CITY.

This Company will not have any auction sale of lots.
Parties desiring full information should address
CARDIFF COAL & IRON CO., 4 Liberty Square, Boston.
H. C. YOUNG, VICE-PRESIDENT, Cardiff, Tenn.
M. M. DUNCAN, GENERAL MANAGER, Cardiff, Tenn.
W. P. RICE, VICE-PRESIDENT, Quincy House, Boston.
CORDLEY & CO., BANKERS, 121 Devonshire St., Boston.

The Opportunity
of a Life.
Don't Neglect It

THE MOST BEAUTIFUL SEASON OF THE YEAR.

Special Excursion Trains
WILL BE RUN
From all Sections of the Country,

ARRIVING IN CARDIFF OCT. 6.

EXCELLENT OPPORTUNITY

Middlesborough,

— * — KENTUCKY.

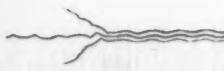
FOURTEEN months ago the population of the present site of Middlesborough, Ky., did not exceed 50; to-day the town has a population exceeding 6,000. It is a conservative estimate to say that in three years 50,000 people will be living here.

The amount of capital now invested in the development of Middlesborough reaches

• \$26,500,000 •

The history of the world does not show an instance of such amazing development in so short a time and on so sure and solid and permanent a foundation.

The developments here are in the hands of English capitalists, whose purpose it is to create around Cumberland Gap the greatest coal and iron development the world has ever known.



Middlesborough Town Co.

Auction Sale of Inside Lots at Roanoke, Va.

The Woodland Park Land Co.

JAMES S. SIMMONS, PRES. AND TREAS.

ROANOKE, VIRGINIA.

This company has purchased the WOODLAND PARK PROPERTY (see map for location) in the heart of Roanoke, and will offer it for sale in lots about the middle of October. Date of Auction Sale will be announced in next week's MANUFACTURERS' RECORD. This property is only $3\frac{1}{2}$ blocks from the business center of Roanoke, the great industrial and commercial center of Southwest Virginia.

All the 200 Lots in it will ultimately be BUSINESS PROPERTY.



1.—BUSINESS CENTER OF ROANOKE. 2.—SITE OF ROANOKE & SOUTHERN FREIGHT STATION. 3.—SITE OF ROANOKE & SOUTHERN PASSENGER STATION.

ROANOKE is the center and headquarters of the industrial movement in Virginia. It is to-day the most conspicuous city in the mineral belt. Its future is absolutely assured. Railroad facilities, established industries, the best tributary territory in America, the backing of the strongest crowd of investors in the South and the energy and enterprise of its own people are the basis of its present prosperity and insures its future growth. Its record of increase from 400 to 22,000 in the last decade will be outdone in the next decade.

For these reasons Roanoke real estate is gilt-edged. It is a good investment. Added to this is an active local market, in which visitors attracted from all quarters take part. Transactions aggregate hundreds of thousands of dollars weekly. It is a market for quick returns and big profits.

\$300,000 paid out monthly at Roanoke to mechanics, miners and railroad men of the Roanoke district.

Woodland Park has on one side the Roanoke Machine Works, employing 1,600 men and the other big industrial establishments of the city, and on the other side the banks, postoffice, retail stores, railway stations and hotels.

Woodland Park lots will be scheduled at prices that will admit of from 100 to 300 per cent. profit immediately.

It is one of the best opportunities for profitable real estate speculation ever offered in the United States.

Large delegations from Baltimore, Philadelphia and New England are expected to attend this sale. It will be the big event of the autumn in Virginia.

WOODLAND PARK LAND COMPANY,

E. A. PARSONS, Secretary.

JAMES S. SIMMONS, President.

THE GOSHEN, VA., SALE.

The First Sale of Lots

WILL TAKE PLACE ON

October 9th and 10th, 1890.

THE ROCKBRIDGE ALUM SPRINGS (20 minutes by rail) will entertain guests at a greatly reduced rate; the Cold Sulphur Springs Hotel, belonging to the Goshen Land & Improvement Company, will also be open, with free hacks for persons attending the sale. The Commercial Hotel at Goshen, belonging to the company, is now open.

The beauty of the location, fine scenery and pure water, make Goshen pre eminent as a town site. It is the center of the great mineral springs belt of Virginia, where thousands from New England and the Gulf gather during the summer for pleasure and health. It is "the land of promise and without plagues." The greatest chance ever offered in Virginia or the South to make money by investing in lots at the first sale (which has never yet failed to make money for the purchaser) is now presented.

More plants secured before the sale; more railroads building to it; more skilled labor to be employed; more houses needed than at any other new town ever started in the South.

within 40 miles, on a direct line to Goshen, as its Southern outlet; the Davis System of West Virginia, representing the Pennsylvania Railroad, is building to a point within 65 miles toward Goshen as its Southern outlet; the Romney & Moorefield Railroad will be extended through Pendleton and Highland counties to Goshen, making in all five railroads. Goshen is the center of the largest deposits of iron ore in Virginia, nearest to the largest and finest body of coking coal in the world, and these railroads will also open to this center the great timber country of West Virginia.

Goshen is to become the great manufacturing center of the Virginias, and to this end has already secured and contracted for more large plants before the first sale of lots than any other new town in the South.

INDUSTRIES SECURED

And Now Under Construction.

| | |
|-----------------------------------------------------------------------------------------------------------------|----------------|
| Victoria Furnace (one of the largest in America) now in operation, employing over..... | 300 men |
| Rolling Mill under construction, with a capital of \$300,000 to employ not less than..... | 250 men |
| Iron Tube Works, with a capital of \$500,000, giving employment to..... | 350 men |
| Car Works, with a capital of \$500,000, which will give employment to..... | 500 men |
| The Woodcock Iron Works Co., of Auburn, New York, capital \$60,000, to employ..... | 60 men |
| Keystone Machine Co. of Williamsport, Pa., to manufacture wood-working machinery, and giving employment to..... | 50 men |
| The Goshen Planing Mill, to employ..... | 60 men |
| The Goshen Brick Co., employing..... | 40 men |
| Total Number of Employees | 1,610 men |
| Capital Invested in the above plants, over..... | \$3,000,000.00 |

In addition to the above, the Goshen Land & Improvement Co. have under direct consideration a large wagon factory from New York, to employ 300 men; large engine works, to employ 350 men; a wood-working establishment, to employ 120 men, and several other important enterprises. **THIS GIVES GOSHEN ON A CERTAINTY SIXTEEN HUNDRED MEN** under employment, the majority of whom will be skilled laborers, insuring a population of 8,000. Including the other enterprises now under consideration, it will give a population of over 11,500.

Now is the Chance of a Lifetime.

Reduced Fare on all Railroads.

THE PALACE HOTEL

is now under construction by R. C. Ballinger & Co., the well-known contractors of Philadelphia. This Hotel, built of stone and pressed brick, will be the finest in the State.

Goshen is the Coming Railroad Center of Virginia.

The junction of the Pittsburgh & Virginia with the Chesapeake & Ohio; the Camden System of West Virginia, representing the Baltimore & Ohio, is building to a point

For Specific Information, Apply, in the West, to H. W. FULLER, G. P. A., Cincinnati, O.; in the East to C. R.

BISHOP, G. P. A., 513 Pennsylvania Avenue, Washington, D. C., or to JNO. D. POTTS,

Passenger Agent, Richmond, Va.

BOSTON CITY,
FORMERLY NEWBERRY,
THE MOST BEAUTIFUL
LONGWOOD PARK
IN THE WORLD.

☞ The present issue of The Grottoes Company's Stock has all been placed, and the Drawing and Allotment of Business Lots will take place Tuesday, October 15th, 1890, and there will be a Sale of Lots immediately after the drawing.

The Grottoes Company

owns **25,000** acres of the best **Iron** and **Timber** lands, and **5,000** acres of unsurpassed **City Site** lands, or 30,000 acres all in one body, including the famous Weyer and Fountain Caves, the noted Grottoes Hotel, a large Electric-Light Plant, two good Water Powers, twenty-five Brick and Frame Houses, a thousand acres of native forests in parks, etc. The buyer of 5 shares of stock will be allotted a good city lot, not less than 25x120 feet in size, without charge; and the buyer of 25 shares of stock will be allotted 5 city lots and one villa lot without charge.

☞ Go and see the property, where the **City of Shendun** is now being laid out, at The Grottoes, Shenandoah Valley Railroad, Augusta and Rockingham counties, Va., and you will agree that *nothing yet offered compares with it in intrinsic value.*

For prospectus, maps and information, address The Grottoes Company, Staunton, Va., or The Grottoes, Va.

**Jed. Hotchkiss, President,
Staunton, Va.**

BEDFORD CITY, VA.

(FORMERLY LIBERTY.)

The Most Beautiful Residence Portion of this Growing City is

LONGWOOD PARK.

The Property of the Longwood Land & Improvement Co.

The property is within five minutes' walk of the N. & W. R. R. depot. It is intersected by broad, oak-shaded avenues, and divided into building lots averaging ninety feet front by 230 feet deep. A superb view of the beautiful Peaks of Otter visible from every part of the property. Prices range from \$6 to \$12 per front foot, according to location, &c.

No Better Investment can be made than in Lots in Longwood Park, at these Prices.

THE CITY HAS AN ESTABLISHED SOCIETY.

Churches, Schools and Academies, (among them the finest in the South,) Manufactures of many kinds, a magnificent supply of Free-stone Water, systems of Arc and Incandescent Electric Lighting, admirable Railroad Connections, a surrounding country of unlimited Mineral Resources and Great Fertility. For further information apply to

R. KENNA CAMPBELL, Gen. Manager

The Longwood Land & Improvement Company.

THE PLACE FOR FACTORIES.

THE ROANE IRON CO.

WILL BUILD UP A

* **LARGE MANUFACTURING CITY** *

AT

ROCKWOOD, TENN.

AND IS PREPARED TO OFFER SUBSTANTIAL INDUCEMENTS TO MANUFACTURERS.

—AS TO RESPONSIBILITY OF THIS COMPANY, PARTIES ARE REFERRED TO EITHER DUNN OR BRADSTREET.—

FOR PARTICULARS ADDRESS

ROANE IRON CO., Rockwood, Tenn

The First Great Sale of Building Lots

BY THE

SHENANDOAH LAND & IMPROVEMENT CO.

OF

SHENANDOAH, Virginia,

Will be held on the
Company's Grounds.

Wednesday, October 8th, 1890,

When 400 Choice
Lots will be Sold.

No Town in the South is offering Equal Advantages as to Location
and Future Profits.

OUR SISTER TOWNS of Buena Vista and Basic City, starting with inferior advantages to ours are on the high road to prosperity. Lots in those towns originally sold for a few hundreds of dollars are now selling at thousands. In fact there is not a town in the Valley where lots have been sold since the new era of Improvement where values have failed to advance. **ALL BUYERS HAVE WITHOUT EXCEPTION PROFITED.**

No of the towns referred to have the advantages offered by Shenandoah, and none of them have had or now have greater financial support. This town has been selected by the most prominent and capable body of men that have done and are now doing so much for Virginia's development as the site of the most extensive and far-reaching system of improvements yet planned in this section. These plans are now being rapidly carried to completion and Shenandoah consequently offers greater advantages and a speedier prospect of large profits to investors than any town in the Valley.

The entire tract of land owned by this company is admirably adapted to the laying off of lots for

quality. Vast bodies of timber lands, furnishing in endless quantity the finest oak, hickory, ash, maple, walnut, chestnut, elm and pine for manufacturing and decorative purposes.

RAILROADS.

The Shenandoah Valley Railroad runs directly through Shenandoah, which will be the terminus of the Washington extension. The West Virginia Central Railroad, as projected, will pass through Shenandoah, opening up the immense mineral deposits of the Massanutton mountains.

PRESENT INDUSTRIES IN OPERATION.

There is a Furnace Company, producing 30,000 tons of foundry and mill iron annually. They also operate a foundry. The Shenandoah Valley Railroad have here their principal machine shop, car shops, blacksmith and boiler shop. There is a brick works and two planing mills.

IMPROVEMENTS DECIDED UPON AND UNDER CONSTRUCTION.

The Land & Improvement Company are building a large and commodious hotel; also a handsome office building. Plans are fully decided upon and work will soon begin on a water works, electric-light plant, water-power facilities, about one hundred dwellings, besides grading streets and laying sidewalks. The Furnace Company, have completed plans and will at once erect another furnace and rolling mill. The Railroad Company will erect a handsome rough stone passenger station, a large freight house, new shop and a round house—doubling present capacity—besides several miles of additional side tracks. Many individuals are building residences and stores.

INDUCEMENTS TO MANUFACTURERS.

The Shenandoah Land & Improvement Company are prepared to offer inducements to manufacturers to locate here, and will treat most liberally with any such who desire to establish industrial plants. By special permission in the charter of Shenandoah, all manufacturers who may establish works here are exempted from corporation taxes for five years. Possessing so many advantages of such varied character, together with the many improvements now fully decided to be established here, there is every reason to believe that, based on a conservative estimate, Shenandoah will have at least 10,000 inhabitants within the next three years.

FOR COPIES OF PROSPECTUS, MAPS OR FURTHER INFORMATION, ADDRESS

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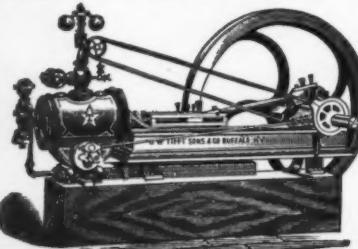
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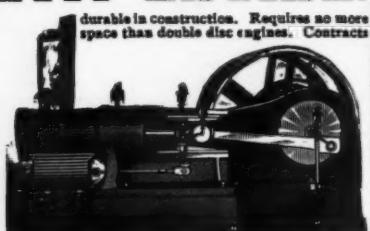
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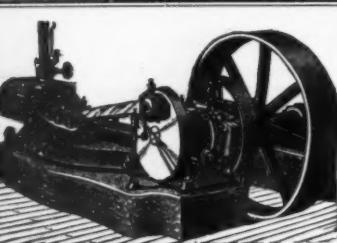
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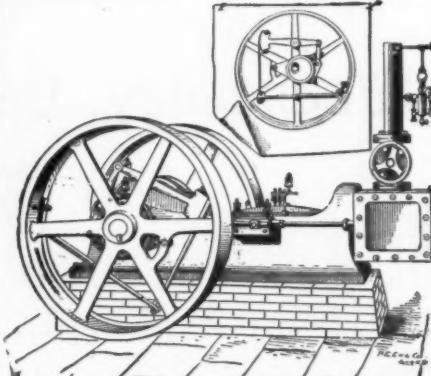
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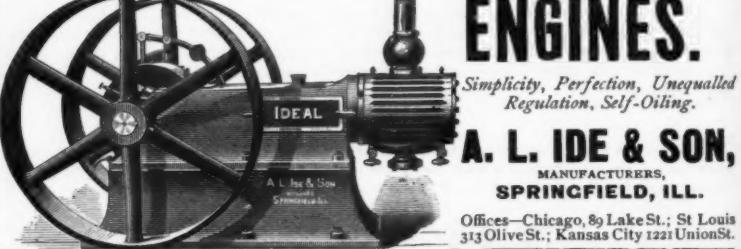
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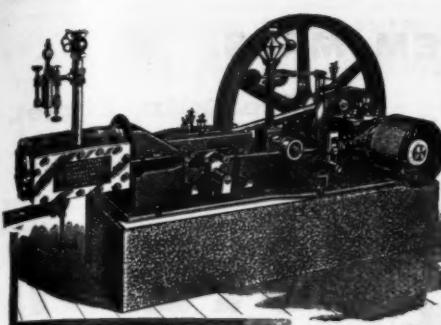
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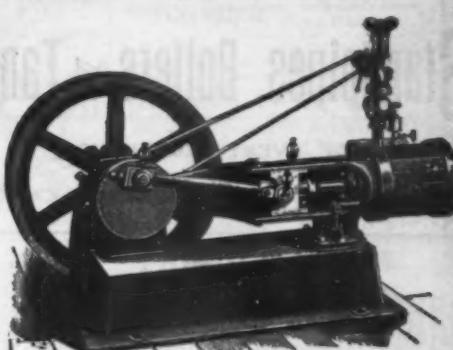
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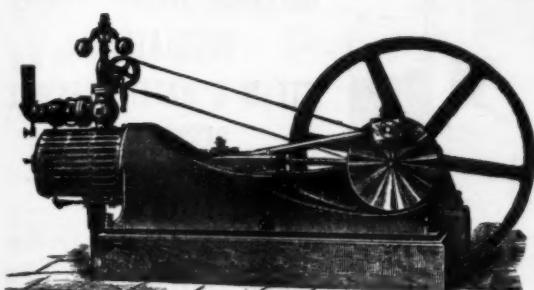
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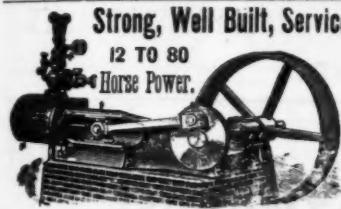
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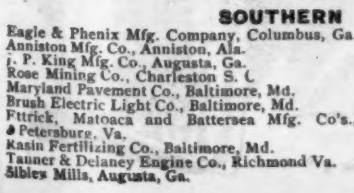
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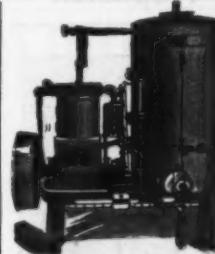
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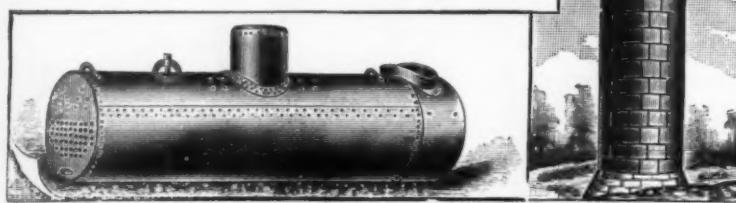
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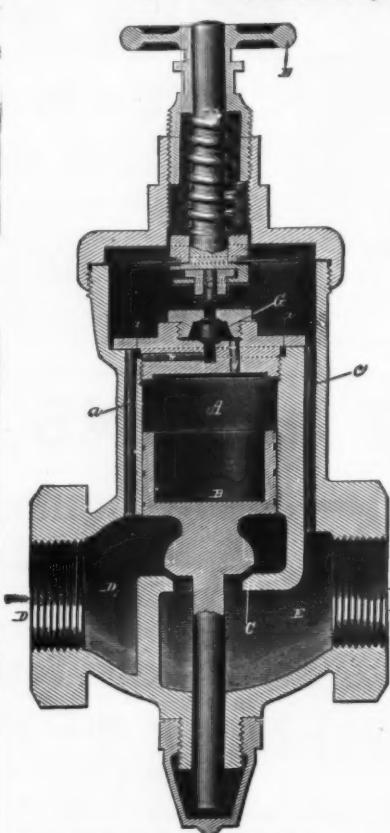
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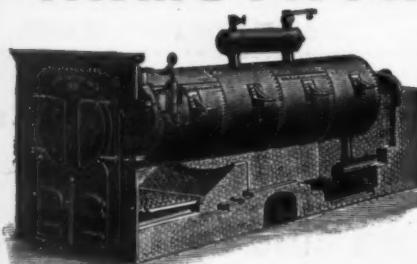


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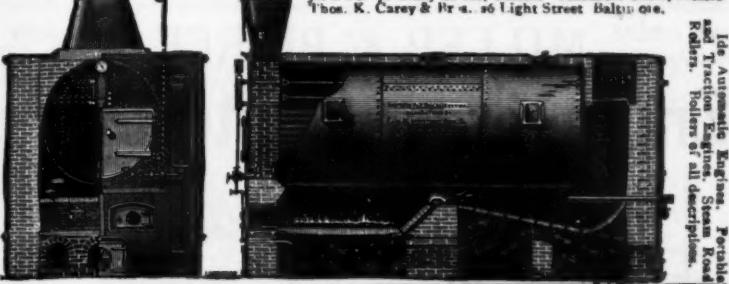
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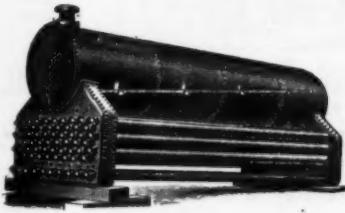
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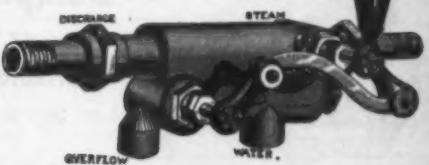
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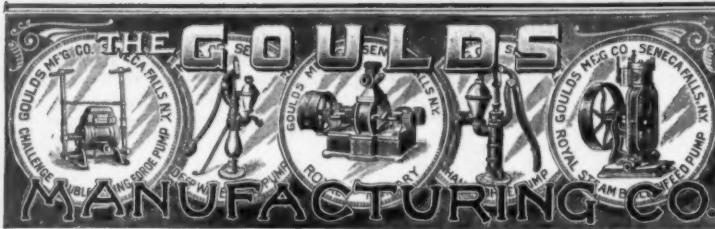
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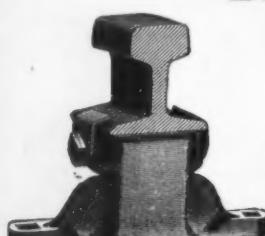
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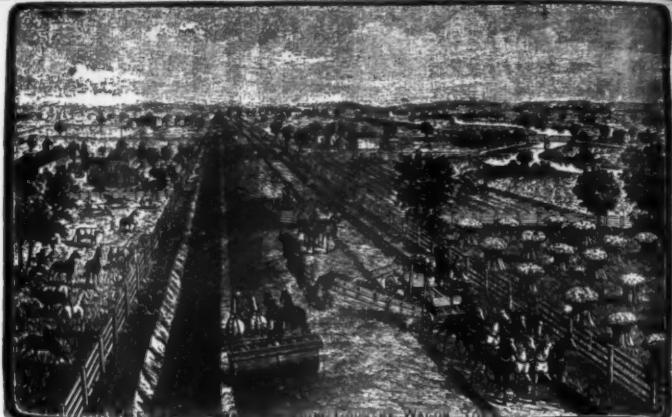


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BROAD & CHERRYNUT STS.

Southern Railroads.

Prosperity of Southern Railroads.

The South was amongst the first to enjoy rail transportation after the iron horse made his advent in this country. Still, it was not long ago that, in speaking of the railways of the United States, the Southern lines were mentioned incidentally as of only secondary importance.

Considered from a revenue standpoint, the great trunk lines demanded first attention, and were of absorbing interest. They were the great money-earners, and their securities were oftenest spoken of and purchased for investment.

From a speculative point of consideration the transcontinental lines were first sighted. They were gigantic enterprises that challenged attention. The boldness of their conception, the problem of their completion, the uncertainty of their profitable operation, the political atmosphere surrounding them, their varying fortunes at the hands of successive Congresses, all lent fascination. They were speculations, and so drew the thought of the speculative.

But a change has come. Gradually, almost imperceptibly, it progressed. Little by little the small lines of the South were amalgamated and extended. Systems grew in geographical extent and financial importance. New industries contributed additional traffic, and for some years past the South has led the rest of the country in the extent of its new railroad construction.

But the roads of the South have not only taken to themselves greater importance physically, but they have also come up to a higher level in the amount of their earnings. For months past the Southern systems have been showing remarkable progress in gross earnings, and in the table of comparative earnings for August last, as compiled by the *Financial Chronicle*, a Southern system holds second place among the large gainers, and out of the list of 20 companies reporting the greatest increase, nine are located in the South.

Furthermore the strides made by Southern railroads in the past few years may safely be taken as an index of what the future will reveal. The impetus which has been imparted will carry railroad interests forward with greater power in the future, and the importance of Southern roads in every respect will be recognized to a degree hitherto unknown.—*Railway Register*.

A CONVENTION of 150 of the influential and representative citizens of Augusta and Rockingham counties was held at Staunton, Va., recently to formulate plans for urging on the authorities of the Cumberland Valley Railroad Co. the feasibility and advisability of the further extension of their road from Winchester to Roanoke, Va., and thus a connection with the Roanoke & Southern or Norfolk & Western. The suggestion is to have the road extended from Winchester through the counties of Frederick, Shenandoah, Rockbridge, Rockingham and Augusta, and to run through the western part of the valley in order to open up and develop the mineral section along the eastern base of the North Mountain, which, it is claimed, is neglected and not reached by the other two railroads—the Baltimore & Ohio and the Shenandoah Valley. A general committee of nine was appointed to wait upon and present a statement to the railroad authorities, and a sub-committee to investigate and collect important information for the first committee. The individual statements to this latter committee were surprisingly voluminous, and numbers of specimens of ores were presented, the principal of which were lead, silver, iron, manganese, anthra-

cite and bituminous coals, together with granite and sandstone. Professional and scientific statements were severally made and repeated as to the varied resources and great imbedded mineral wealth of the particular section referred to, and the Valley of Virginia in general. It is not to be inferred from any action of the convention that the citizens of the above counties are able or ready to build the road by subscriptions, but only that the people are confident of what the country possesses, and wish to induce an enterprising railroad corporation to take advantage of the inviting field, in order to bring more capital to their aid, and to give them another outlet for the increasing volume of business which they are confident the next few years will bring about.

The enterprise at present is not positive and only undeveloped, but the gentlemen of Augusta and Rockingham counties who are active in the undertaking are in earnest, and the spirit shown is but a further development of that progressive movement which has been active in building up the magic towns of this section. The non-completion of the Baltimore & Ohio Valley Branch from Lexington to Salem, which has long since been graded, has kept this section of Virginia from a close connection with Baltimore, its natural outlet, and with which its people have long been connected by business and other relations. The Cumberland Valley Railroad starts at Harrisburg, Pa., and runs to Hagerstown, Md., and from thence to Martinsburg, W. Va. From this latter place it completed an extension of its line to Winchester, Va., about a year ago.

* * *

THE Choctaw Coal & Railway Co.'s Eastern Division, extending from McAlester to Wistar Junction, Indian Territory, has been completed. This line will connect the Missouri, Kansas & Texas Railroad with the St. Louis & San Francisco Railroad, and will enable a material shortening of time between Northern and Texas points. Construction of this line was commenced one year ago, and its more rapid completion was impossible on account of the long, wet winter, which made the roads impassable for the hauling of ties and other material. The road will have an outlet for its coal to Arkansas points over the St. Louis & San Francisco Railroad, and expects to find a ready market for the same. From Hartshorne the Southern Division will branch to Denison, Texas, and will obtain the haul on a heavy tonnage of coal. The output of the mines along this proposed branch is already about 600 tons per day. The contract for the Western Division, from McAlester to Fort Reno, 165 miles, has been awarded, and work will soon be commenced and pushed to a rapid completion. This extension will open the coal trade of Oklahoma to the company. This line will also afford a connection with the Atchison and Rock Island Railroads. The total projected mileage of the system is about 450 miles. The company was chartered by act of Congress in 1888.

* * *

THE Queen & Crescent Route has 200 new cars under construction at the Elliott Car Works, Gadsden, Ala. The cars are to be equipped with automatic couplers and air brakes, and all freight cars on that line when sent to the shops for repairs are to be similarly equipped.

The Most REMARKABLE REAL ESTATE SALE ever held in the South is advertised on PAGE 31.

READ ABOUT IT.

Railroad Construction

Athens, Tenn.—Railroad.—George C. Hall commenced surveying on the proposed Cincinnati & Atlanta Railroad, as lately stated. He is surveying a line to the Tennessee river to extend beyond and connect with the Cincinnati Southern at Cardiff, and when completed will return to Athens and survey a line south to the Knoxville Southern near Starr mountain.

Atlanta, Ga.—Railroad.—It is reported that the preliminary survey has been completed for the extension of the Seaboard Air Line from Atlanta to Selma, Ala., 20 miles.

Baltimore, Md.—Belt Railroad.—The Baltimore Belt Railroad Co., lately mentioned as awarding contracts for construction, has executed a first mortgage on its entire line, to be built from Camden station to Bayview Junction, and all property now owned or to be acquired, with the Mercantile Trust & Deposit Co. as trustee, to cover the issuance of \$6,000,000 in bonds of \$1,000 each, bearing interest at five per cent. The Baltimore & Ohio Railroad Co., which holds a contract for the use of the Belt line, agrees to make good any deficiency in the net earnings to meet the interest

Bremen, Ga.—Railroad.—George Hopper, of Atlanta, is said to be organizing a company to build a railroad from Bremen to Bowdon.

Broadway, Va.—Railroad.—The building of a railroad from Broadway to the West Virginia line, and from Broadway via New Market and Luray to Acquia creek, is said to be probable. E. D. Root can give information.

Buena Vista, Va.—Street Railway.—It is reported that a street railway will be constructed on the property of the Loch Laird Estate & Mineral Co., referred to elsewhere in this issue.

Carrollton, Ga.—Railroad.—The construction of a railroad from Carrollton to Marietta is talked of.

Chattanooga, Tenn.—Railroad.—It is reported that the survey has been completed for the projected railroad, lately mentioned, from Chattanooga to Evansville, Ind., and which is known as the Chicago, Evansville, Bowling Green & Chattanooga Railroad. The road, when built, will, it is stated, be extended to Atlanta, and thence to the coast.

Dayton, Tenn.—Dummy Line, etc.—The Tennessee Industrial Land Co., mentioned elsewhere in this issue, proposes constructing a dummy line and securing the building of an electrical railroad.

Decatur, Ala.—Railroads.—It is reported that J. E. T. Ruthen, manager of the Decatur Land Co., has closed contracts for the building of a line by the East Tennessee, Virginia & Georgia Railroad Co. (office, Knoxville, Tenn.) to connect its system with New Decatur, and contracts have been signed insuring the completion at once of the Rome & Decatur Railroad (office, Rome, Ga.) from Attalla to Decatur.

Edinburg, Va.—Railroad.—The Liberty Iron Co., H. H. Yard, of Philadelphia, Pa., president, is building the railroad from Edinburg to Columbus and Liberty Furnaces, lately reported. It is to be a narrow-gauge road 11 miles long.

Elkhorn, W. Va.—Railroad Tunnel.—Mason, Locher & Co. have been awarded contract for constructing the tunnel in Logan county on the Elkhorn extension of the Norfolk & Western Railroad (office, Roanoke, Va.).

Elkton, Va.—Railroad.—The building of a railroad from Elkton to Harrisonburg is proposed. The Elkton Co. can give information.

Farmville, Va.—Railroad.—The Farmville & Powhatan Railroad Co. (office, Richmond) is reported as to change the gauge of its road and extend same to Roanoke via Brookneal.

Fincastle, Va.—Railroad.—The building of a railroad to Roanoke is talked of.

Franklin, N. C.—Railroad.—Macon county will hold an election to consider the issuing of \$100,000 of bonds for a railroad from Franklin to Tallulah Falls, Ga.

Frederick—Railroad.—The Monocacy Valley Railroad Co. has been organized to build a railroad from Catoctin furnace to Frederick. The capital stock is \$100,000. The Frederick City Manufacturing & Development Co. is interested.

Galveston, Texas—Electrical Railroad.—The Galveston Rapid Transit Belt Line Co., lately reported as chartered, has not yet decided on motive power, but prefers electricity. The capital stock is \$100,000.

Greeneville, Tenn.—Railroad.—Greene county has decided by a popular vote to subscribe for \$100,000 of the stock of the proposed Carolina, Greeneville & Northern Railroad, lately mentioned. The city voted \$25,000 for the same purpose.

Greenwood, S. C.—Railroad.—J. G. Gibbs, of Columbia, is reported as surveying a railroad from Greenwood to Johnston, and it is intended to induce the Carolina, Knoxville & Western Railroad Co. to build from Greenville via Greenwood to Johnston.

Houston, Texas—Railroad.—The International & Great Northern Railroad Co. (office, Palestine),

lately noticed, is renewing the tie on its Columbus branch, but does not intend laying steel rails for the present.

Houston, Texas—Street Railway.—The Houston Street Railway Co. has amended its charter, increasing capital stock from \$200,000 to \$400,000.

Houston, Texas—Electrical Railroads.—The Houston City Street Railway and the Bayou City Street Railway, previously reported as to be changed to electrical roads, have been purchased by parties who have organized a company with E. A. Allen, president; H. F. MacGregor, vice-president, and C. A. McKinney, secretary. The company intends to equip both roads with electric power at once, and expects to expend about \$350,000 on improvements.

Huntsville, Ala.—Railroad.—A report is made that Huntsville will be required to subscribe \$100,000 to secure the Tennessee & Coosa Valley Railroad.

Little Rock, Ark.—Railroad.—The Kansas City, Fort Scott & Memphis Railroad Co. (office, Kansas City, Mo.) is reported as surveying for the construction of a railroad from Springfield, Mo., to Little Rock.

Louisville, Ky.—Street Railway.—The Louisville Street Car Co. decided at a recent meeting to extend its street railway.

Louisville, Ky.—Electrical Railroad.—Coleman, Bush & Co. contemplate building an electrical railroad to Jacob Park.

Louisville, Ky.—Railroad.—It is reported that the East Tennessee, Virginia & Georgia Railroad Co. (office, Knoxville, Tenn.), lately reported (under Louisville) as purchasing the Kentucky Union Railway, has closed a deal for the purchase of that road and the Lexington Belt Line.

Lynchburg, Va.—Belt Railroad.—C. R. Moorman & Co. have been awarded contract for the extension of the belt railroad previously referred to.

Madison, N. C.—Railroad.—The construction of a railroad from Madison to Oxford is proposed.

Millen, Ga.—Railroad.—The Millen & Southern Railroad Co. is reported as to extend its road from Millen northeasterly through Scriven and Burke counties; also from Sterling or some other point in Montgomery county on the line of the Savannah, Americus & Montgomery Railroad in a southerly direction.

Mineral Wells, Texas—Railroad.—The town has, it is stated, accepted a proposition from R. L. Stone, of Kansas City, Mo., president of the Weatherford, Mineral Wells & Northwestern Railroad, to complete the road to Mineral Wells by January 1, 1891, for a bonus of \$12,000 and depot grounds.

Morristown, Tenn.—Railroad.—It is rumored that the Norfolk & Western Railroad Co. (office, Roanoke, Va.) will purchase the East Tennessee, Virginia & Georgia Co.'s (office, Knoxville) road from Morristown to Bristol, and the latter will, if the sale is consummated, double-track its road from Morristown to Knoxville.

Murphy, N. C.—Railroad.—Dr. N. I. Mays, J. G. Carter and others, of Chattanooga, Tenn., have secured a charter for a railroad from Murphy to Dayton, Tenn., and surveying is reported as commenced.

Nashville, Tenn.—Railroad.—The Nashville, Chattanooga & St. Louis Railway Co. will consider, at a meeting of shareholders to be held October 29, the increase of the capital stock, mentioned last week.

Norfolk, Va.—Railroad.—The Norfolk & Virginia Beach Railroad Co. writes that under its present charter it is unable to make the improvements lately referred to, and will have to await the next Virginia legislature for the necessary legislation.

Ocean City, Md.—Electrical Railroad.—The Synepuxent Beach Co. contemplates the construction of an electrical railroad.

Palestine, Texas—Electrical Railroad.—A \$2,000 stock company is reported as organized to build an electrical railroad.

Portsmouth, Va.—Railroad.—The Atlantic & Danville Railroad Co. is to be reorganized October 1.

Radford, Va.—Railroad.—The Norfolk & Western Railroad Co. (office, Roanoke) is said to have purchased the Radford & Little River Railroad, a short branch.

Roanoke, Va.—Railroad.—The sale of the Shenandoah Valley Railroad, previously mentioned, is to take place September 30. A plan for reorganization has made its appearance. It proposes the purchase of the road by the bondholders and the issuance of \$10,000,000 of 50-year 5 per cent. mortgage bonds, \$4,500,000 of preferred stock and \$2,500,000 of common stock; the preferred and common stock to be transferred to the Norfolk & Western Railroad Co. in consideration of guaranteeing the new bonds; \$1,000,000 are to be spent in the construction of a road from Frost Royal to Washington, D. C., and securing a terminus in the latter city.

Shendum, Va.—Street Railway.—The Grottoes Co. has, it is stated, closed contract for the construction of a street railway.

Spartanburg — Railroad.—The Spartanburg, Glendale & Clifton Railroad Co., lately referred to, will build a line to connect the towns mentioned in its title. The road will be about 10 miles long.

Stevenson, Ala.—Railroad.—The Stevenson, Sand Mountain & Dalton Railroad Co., previously reported as to build a road from Stevenson to the Birmingham Mineral Railroad at or near Walnut Grove, has commenced surveying.

Stevenson, Ala.—Railroad.—The Georgia, Tennessee & Illinois Railroad Co. has been incorporated by J. H. Plummer, J. M. McBride and others, of Tallapoosa, Ga.; J. A. Burn, of Atlanta, Ga., and W. B. Thomas, of Tennille, Ga., to build a railroad from some point on the Georgia State line to Stevenson.

Union, S. C.—Railroad.—Application is to be made to the general assembly of the State at its next session for a charter for a railroad to run from Lockhart Shoals to Union or some place on the Spartanburg & Union Railroad.

Cotton Centennial Exhibition.

An interesting event will be celebrated next week at Pawtucket, Rhode Island. It is to celebrate the beginning of the manufacturing of cotton fabrics in this country. The history it recalls is full of interest.

On November 13th, 1789, a young Englishman named Samuel Slater landed in New York. He was a native of Derbyshire, then the only place in Great Britain where cotton goods were made by machinery. He had served an apprenticeship of six and a-half years in the mills of Jedidiah Strutt, the partner of Sir Richard Arkwright, the famous inventor, and at the expiration of his indenture was made foreman of the establishment. When he was but twenty two years of age he read in a newspaper that the Pennsylvania legislature had given £100 to the inventor of a carding machine. This begot in him a determination to emigrate to the United States and engage in business. At that time British laws were in force forbidding machinists to leave the Kingdom, or to send away models or drawings of machinery. Samuel Slater succeeded in eluding the vigilance of the authorities, but he did not dare to take away any drawings or descriptions of machines, but trusted to his memory all details of their construction. On the 18th of January, 1790, he reached Pawtucket, and there he began at once to make cotton-spinning and carding machines. In December of the same year he had completed a number and started them in operation. Several New England men had spent considerable money in unsuccessful attempts to make yarns and cloth prior to the advent of Mr. Slater, but his were the first practical machines ever used in this country. From their completion dates the beginning of cotton spinning by power machinery in the United States, and justifies the appellation, "the father of American manufacturers," as applied to Mr. Slater during all the later years of his use ful life.

The commemorative exhibition at Pawtucket will open next Monday and be continued for a week at least, during which time it will be visited by nearly all the cotton manufacturers of the North and by many from other sections.

This centennial celebration will

afford an unusual opportunity to the business managers of new towns in the South to meet cotton manufacturers from all parts of the North, and through this they may be able to secure the transfer of many enterprises from where they are now established to other and much more favorable sites. Not only will the cotton spinners be there in force, but great numbers of subsidiary industries will also be represented, and at the present juncture the latter are most needed in the South, for it cannot reasonably expect to rival New England in the production of the finer classes of fabrics until it has similar industries established side by side with its cotton mills.

A NEW use for cast iron has recently been patented by a mechanic of Erfurt, Germany. He makes a hollow cast iron brick, the shell of which is about an eighth of an inch thick. No mortar is used in wall construction, for the bricks have grooves and protecting ribs which fit each into the other, thus making a complete union. In the upper side of each brick are two circular openings, and on the lower are two corresponding projections which fit into the circles. One of these projections is made hook-shaped for the greater security of its hold. Technical European journals state that these bricks can be put together and taken apart without any injury to them, and that they make a solid and handsome wall. Here is an idea that may possibly be improved upon by some one of the many ingenious mechanics employed in Southern iron foundries.

A Correction.

[Special dispatch to MANUFACTURERS' RECORD.]

MIDDLEBOROUGH, KY., Sept. 24, 1890.

I notice in your issue of 20th inst. a dispatch from Morristown, saying that a charter has been applied for by A. A. Arthur, W. E. Scarritt and others for the Grotto Land Co. Please note that the parties interested in this matter have unwarrantably used my name, and that I have no connection whatever with the enterprise in question. A. A. ARTHUR.

Southern Financial News.

NEW BANKS.

Baltimore, Md.—The Richmond Permanent Loan & Savings Association has been incorporated by George Kranz, Caspar Westmeier, Samuel Oberndorf and others. The capital stock is \$50,000.

Beaumont, Texas.—Another national bank with a capital stock of \$100,000 will, it is stated, be organized.

Big Stone Gap, Va.—The Appalachian Bank has been organized with W. A. McDowell, president and C. H. Berryman, cashier.

Chester, S. C.—The Exchange Bank of Chester has been chartered with a capital stock of \$75,000. J. L. Agurs, Joseph Wylie, J. K. Henry and others are among the incorporators.

Corpus Christi, Texas.—The Corpus Christi National Bank has been organized with D. Hirsch, president, and Thomas Hickey, cashier. The capital stock is \$100,000.

Jonesborough, Ark.—The Craighead County Bank has been organized with J. H. Kitchen, president, and H. D. Smith, of West Plains, Mo., cashier; capital stock \$50,000.

Knoxville, Tenn.—The Knox County Banking & Trust Co. has been organized with A. C. Chavannes, president, and C. W. Karns, cashier. The capital stock is \$100,000.

Lawrenceville, Va.—E. Dromgoode is president, and C. E. May, cashier, of the Bank of Lawrenceville, previously reported as organized with a capital stock of \$100,000.

Memphis, Tenn.—The Continental Savings Bank has been chartered by J. C. Neely, J. S. Day, C. J. Dabb and others. A safe deposit and trust department will be operated in connection with the bank.

Mobile, Ala.—The national bank previously mentioned is to be organized as the Alabama National Bank with a capital stock of \$500,000. Mr. Hallack can give particulars.

Opelika, Fla.—The organization of a new bank with a capital stock of \$100,000 is proposed. Augustus Barnes can give information.

Richmond, Va.—The Co-operative Investment Association has been chartered with a maximum capital stock of \$200,000. W. B. Waldron is president; F. Jones, secretary, and W. F. Pleasants, treasurer.

Sanford, Ky.—The Lincoln National Bank will be changed to a State institution to be known as the Farmers' Banking & Trust Co.

Squatchie, Tenn.—A new bank is talked of.

Spring City, Tenn.—The Bank of Spring City has commenced business with a capital stock of \$25,000. John Pyott is president, and W. A. Bradley, cashier.

Staunton, Va.—The Southern Investment Co. has been chartered with G. C. Jordan, president; Asher Ayers, treasurer, and D. Pickard, secretary. The capital stock is \$100,000.

Waynesboro, Va.—W. T. Omwake and associates propose organizing the People's National Bank of Waynesboro with a capital stock of \$50,000.

Whitesburg, Tenn.—H. C. Kerber, W. S. Kyle and others are organizing the Farmers' Bank with a capital stock of \$25,000.

Macon county, N. C., will hold an election to consider the issuance of \$100,000 of bonds for a railroad from Franklin, N. C., to Tallulah Falls, Ga.

Mecklenburg county, N. C., will refund \$300,000 of 7 per cent. bonds expiring November 1 by issuing bonds bearing interest at 5 per cent. Captain Vail, of Charlotte, N. C., can give particulars.

The Baltimore Belt Railroad Co., of Baltimore, Md., has executed a first mortgage on its road and all property owned or to be acquired with the Mercantile Trust & Deposit Co., of this city, as trustee, to cover the issuance of \$6,000,000 in bonds of \$1,000 each, bearing interest at five per cent., payable semi-annually in May and November, and due November 1, 1990. The Baltimore & Ohio Railroad Co. agrees to pay any deficiency in the net earnings of the Belt Road to meet the semi-annual interest.

The reorganization plan for the Shenandoah Valley Railroad (office, Roanoke, Va.) contemplates the issuance of \$10,000,000 of 50 year 5 per cent. mortgage bonds, \$4,500,000 of preferred stock and \$2,500,000 of common stock.

See Page 31.

Half-Fare Home-Seekers' Excursion South.

Those contemplating a trip to the New South for pleasure or in quest of new fields of labor, should not fail to write to or call on any agent of the Queen & Crescent Route. This line will on September 9 and 23 and October 14 sell round-trip tickets to points in Tennessee, Georgia, Alabama, Mississippi, Louisiana, Florida, Arkansas and Texas at one fare for the round trip. Tickets good 30 days for return. Four express trains leave Grand Central Depot, Cincinnati, daily, with through sleeping cars for Harriman, Cardiff, Rockwood, Chattanooga, Attala, Birmingham, Meridian, New Orleans and Jacksonville, Fla., making connection with through sleeper, Chattanooga to Jackson and Vicksburg, Miss. This is your opportunity to visit the booming South. The fall is the time to see it. September and October are pleasant months to travel. Be sure and ask for rates and tickets via Queen & Crescent Route, or address D. G. Edwards, G. P. and T. A., Cincinnati, Ohio.

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Foreign Exchange Quotations.

ALEXANDER BROWN & SONS.

BALTIMORE, September 24, 1890.

| | | |
|--------------|----------|-------------|
| Sterling. | Selling. | Commercial. |
| 60 days.... | 480 3/4 | 479 1/2 |
| 3 days.... | 484 1/4 | |
| Francs.— | | |
| 60 days.... | 521 1/2 | Commercial. |
| 3 days.... | 519 1/2 | 525 1/2 |
| Reichmarks.— | | |
| Selling. | | Commercial. |
| 60 days.... | 94 1/2 | 60 days.... |
| 3 days.... | 95 1/2 | 93 1/2 |
| Guilders.— | | |
| Selling. | | Commercial. |
| 60 days.... | 39 15/16 | 60 days.... |
| 3 days.... | 39 3/16 | 39 1/16 |

Baltimore Stock Exchange Quotations.

Reported by ALEXANDER BROWN & SONS, Bankers, Baltimore.

BALTIMORE, Sept 17, 1890.

| | |
|---------------------------------------|---------|
| Virginia 6's Consols C..... | 52 |
| Virginia 3 1/2 to 40's..... | 35 |
| Virginia 3's, new..... | 67 1/2 |
| Virginia Consol Coupons, N. F..... | 25 1/2 |
| N. Carolina 4's..... | 99 |
| N. Carolina 6's..... | 125 1/2 |
| Norfolk Water 8's..... | 130 |
| Ga. Car. & N. 5's..... | 102 |
| Atlanta & Char. 1st 7's..... | 121 1/2 |
| Col. & Green. 1st 6's..... | 107 1/2 |
| Col. & Green. 2d 6's..... | 87 |
| Va. Midland, 2d 5's..... | 107 |
| Va. Midland, 5th 5's..... | 106 1/2 |
| Charlotte, C. & Aug. 1st 7's..... | 106 |
| West Va. 1st 6's..... | 110 |
| Ga. Pacific 1st 6's..... | 111 1/2 |
| Ga. Pacific 2d..... | 78 |
| West. Nor. Car. Cons'd 6's, Gold..... | 102 |
| Cape Fear & Y. Valley 6's, A..... | 105 1/2 |
| Cape Fear & Y. Valley 6's, B..... | 102 |
| Cape Fear & Y. Valley 6's, C..... | 103 1/2 |

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SATURDAY, SEPTEMBER 20, 1890.

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| BANKS. | Organized. | Capital. | LAST DIVIDEND. | Per Cent. | Declared. | on Stock. | Bid. | Asked. |
|---------------------------------------|------------|---------------------|----------------|----------------|-----------|-----------|------|--------|
| Alabama National | 1886 | \$500,000 | July '90 | 4 | 111 | 116 | ... | ... |
| American National | 1887 | 250,000 | July '90 | 4 | 100 | 100 | ... | ... |
| Bank of Attala | 1889 | 50,000 | July '90 | 5 | 61 | 61 | ... | ... |
| Berney National | 1886 | 300,000 | July '90 | 5 | 127 1/2 | 95 1/2 | ... | ... |
| Birmingham National | 1887 | 250,000 | July '90 | 3 | 95 | 95 | ... | ... |
| Central Savings | 1889 | 50,000 | July '90 | ... | 175 | ... | ... | ... |
| City National | 1889 | 100,000 | July '90 | ... | 184 | ... | ... | ... |
| First National | 1884 | 250,000 | July '90 | 6 | 145 | 145 | ... | ... |
| First National Bank of Gadsden | 1887 | 50,000 | July '90 | 6 | 145 | 145 | ... | ... |
| Jefferson County Savings | 1885 | 150,000 | July '90 | 6 | 105 | 105 | ... | ... |
| Birmingham Trust & Savings Co. | 1887 | 500,000 | July '90 | 3 | 100 | 100 | ... | ... |
| Mutual Loan & Trust Co. | 1888 | 30,000 | July '90 | ... | 115 | 115 | ... | ... |
| People's Savings Bank & Trust Co. | 1888 | 50,000 | July '90 | 4 | 115 | 115 | ... | ... |
| RAILROADS. | | | | | | | | |
| Birmingham Union Railway Co. | 1887 | 1,000,000 | ... | ... | 24 | 24 | ... | ... |
| Birmingham & Ensley Railway Co. | 1887 | 500,000 | ... | ... | 25 | 25 | ... | ... |
| North Birmingham Street R. R. | 1887 | 65,000 | ... | ... | 50 | 50 | ... | ... |
| Highland Avenue & Belt R. R. Co. | 1887 | 1,000,000 | ... | ... | 45 | 45 | ... | ... |
| South & North Alabama R. R. Co. | 1887 | ... | ... | ... | 20 | 20 | ... | ... |
| MISCELLANEOUS. | | | | | | | | |
| Avondale Land Co. | 1884 | 150,000 | Oct. '88 | 2 | ... | ... | ... | ... |
| Anniston City Land Co. | 1887 | 3,000,000 | July '87 | 4 | 57 | 59 | ... | ... |
| Alabama Coal & Iron Co. | 1890 | 1,000,000 | Aug. '90 | 2 | 100 | 100 | ... | ... |
| Alabama-Connell's Coal & Coke Co. | 1886 | 500,000 | ... | ... | 23 | 23 | ... | ... |
| Alabama Rolling Mill Co. | 1887 | 250,000 | ... | ... | 60 | 60 | ... | ... |
| Bessemer Land Co. | 1887 | 2,500,000 | May '87 | 3 1/2 | 35 | 35 | ... | ... |
| Birmingham Mining & Mfg. Co. | 1887 | 150,000 | Mch. '87 | 9 3/4 | 65 | 65 | ... | ... |
| Birmingham Ensley Land Co. | 1886 | 450,000 | July '89 | 10 | 105 | 105 | ... | ... |
| Birmingham Ice Factory | 1886 | 85,000 | ... | ... | 78 | 78 | ... | ... |
| Birmingham Water Works Co. | 1887 | 500,000 | ... | ... | 25 | 25 | ... | ... |
| Birmingham Soap Works Co. | 1886 | 50,000 | ... | ... | 16 | 16 | ... | ... |
| Brooklyn Land Co. | 1886 | 1,400,000 | ... | ... | 70 | 70 | ... | ... |
| Birmingham Furnace & Mfg. Co. | 1886 | 1,500,000 | ... | ... | 25 | 25 | ... | ... |
| Camille Gold Mining Co. | 1887 | 1,400,000 | ... | ... | 10 | 10 | ... | ... |
| Calhoun Coal Mining Co. | 1887 | 1,400,000 | ... | ... | 81 | 81 | ... | ... |
| Chattanooga East End Land Co. | 1887 | 1,000,000 | ... | ... | 65 | 65 | ... | ... |
| DeBardelben Coal & Iron Co. | 1887 | 4,000,000 | ... | ... | 13 1/2 | 13 1/2 | ... | ... |
| Decatur Land Imp. & Furnace Co. | 1887 | 5,000,000 | Oct. '87 | 0 3 | 12 1/2 | 19 | ... | ... |
| Decatur Mineral Land Co. | 1887 | 350,000 | Nov. 10, '87 | ** | 850 | 925 | ... | ... |
| Elyton Land Co. | 1871 | 200,000 | July '89 | 4 | 102 | 102 | ... | ... |
| Edison Electric & Illuminating Co. | 1886 | 100,000 | ... | ... | 11 1/2 | 11 1/2 | ... | ... |
| East Birmingham Land & R. R. Co. | 1886 | 1,022,800 | June '87 | 11 1/2 | 80 | 80 | ... | ... |
| East Lake Land Co. | 1886 | 200,000 | ... | ... | 9 | 10 1/2 | ... | ... |
| Ensley Land Co. | 1886 | 10,000,000 | ... | ... | 22 1/2 | 32 1/2 | ... | ... |
| Enterprise Manufacturing Co. | 1886 | 100,000 | ... | ... | 20 | 20 | ... | ... |
| Eureka (Furnace) Co. | 1887 | 3,000,000 | April. '89 | 1 | 21 | 21 | ... | ... |
| Gadsden Land Co. | 1887 | 3,000,000 | April. '87 | q 1 | 4 1/2 | 5 1/2 | 20 | ... |
| Gate City Land Co. | 1887 | ... | ... | ... | 10 | 10 | ... | ... |
| Hecla Coal Co. | 1888 | 300,000 | ... | ... | 81 | 81 | ... | ... |
| Henderson Steel & Mfg. Co. | 1887 | 100,000 | ... | ... | 65 | 65 | ... | ... |
| Jefferson Building & Improvement Co. | 1887 | 150,000 | ... | ... | 32 | 32 | ... | ... |
| Jagger-Townley Coal & Coke Co. | 1887 | 350,000 | ... | ... | 10 | 10 | ... | ... |
| Leeds Land Co. | 1887 | 150,000 | ... | ... | 52 | 52 | ... | ... |
| Mag Ellen Coal & Mining Co. | 1887 | 100,000 | ... | ... | 62 | 62 | ... | ... |
| Mary Lee Coal & Railway Co. | 1888 | 500,000 | ... | ... | 20 | 20 | ... | ... |
| Smithfield Land Co. | 1886 | 700,000 | ... | ... | 60 | 60 | ... | ... |
| Sloss Iron & Steel Co. | 1887 | 850,000 | ... | ... | 34 | 34 | ... | ... |
| South Anniston Land Co. | 1887 | 750,000 | Apr. 15, '90 | h 1 | 40 | 40 | ... | ... |
| Sheffield Coal & Iron Co. | 1883 | 1,000,000 | Mch. '87 | x 5 | 54 | 54 | ... | ... |
| Thompson Brick Co. | 1887 | 20,000 | Feb. '88 | x 5 | 90 | 90 | ... | ... |
| Tennessee Coal & Iron Co. | 1867 | 9,000,000 | May 15, '87 | ... | 45 1/2 | 46 1/2 | ... | ... |
| Tennessee Coal & Iron Co., pref. | 1887 | 1,000,000 | ... | ... | 100 | 105 | ... | ... |
| Tuskaloosa Coal, Iron & Land Co. | 1887 | 1,000,000 | ... | ... | 22 1/2 | 22 1/2 | ... | ... |
| Vulcan Coal & Coke Co. | 1886 | 100,000 | ... | ... | 5 | 5 | ... | ... |
| West End Land Co. | 1886 | 175,000 | ... | ... | 50 | 50 | ... | ... |
| Woodstock Iron Co. | 1887 | 3,000,000 | ... | ... | 40 | 40 | ... | ... |
| BONDS. | | | | | | | | |
| Alice Furnace | ... | Amount Outstanding. | INTEREST. | Rate Per Cent. | Bid. | Asked. | ... | ... |
| Birmingham Gas & Electric Light Co. | ... | 300,000 | ... | 7 | 103 | ... | ... | ... |
| Birmingham Union Railway Co. | ... | 340,000 | ... | 8 | ... | ... | ... | ... |
| Birmingham Water Works. | ... | 500,000 | ... | 6 | 92 1/2 | 100 1/2 | ... | ... |
| Calhoun C. & M. Co., 1st Mortgage. | ... | 400,000 | ... | 6 | 108 | ... | ... | ... |
| Caldwell Hotel. | ... | 750,000 | ... | 8 | 111 | 116 | ... | ... |
| Elyton Land Co., Trust Bonds. | ... | 150,000 | ... | 6 | 99 | ... | ... | ... |
| Eureka (Furnace) Co. | ... | 2,400,000 | ... | 6 | 97 | ... | ... | ... |
| Henderson Steel & Mfg. Co. | ... | 400,000 | ... | 7 | 109 | 103 1/2 | ... | ... |
| Mary Pratt Furnace | ... | 30,000 | ... | 8 | ... | 81 | ... | ... |
| Sloss Iron & Steel Co., 1st Mortgage. | ... | 2,000,000 | ... | 6 | 91 | ... | ... | ... |
| Williamson Iron Co. | ... | 2,000,000 | ... | 6 | ... | 65 | ... | ... |
| Tennessee Coal, Iron & R. R. Co. | ... | 60,000 | ... | 8 | 100 1/2 | ... | ... | ... |
| Williamson Iron Co. | 1887 | 1,254,000 | ... | 6 | 96 1/2 | ... | ... | ... |
| Birmingham Division. | ... | 3,640,000 | ... | 6 | ... | ... | ... | ... |

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RICHMOND, VA., September 23, 1890.

110 ASKED.

| | 110 ASKED. |
|--------------------------------------------------------|---------------|
| North Carolina 4's, 1910. | 95 101 |
| North Carolina 6's, 1919. | 125 129 |
| Virginia 3's, 1932. | 67 76 1/2 |
| Dauville 5's. | 100 103 |
| Lynchburg 5's, 1915. | 103 |
| Petersburg, Va., 5's, 1918. | 104 |
| Norfolk, Va., 5's, 1911. | 106 |
| Richmond, Va., 5's, 1922. | 110 112 |
| Atlanta & Charlotte, Ga. 6's, 1900. | 122 |
| Atlanta & Charlotte, Ga. 6's, 1922. | 105 107 |
| Char. Col. & Aug. R. R. Gen. 6's, 1932. | 109 |
| Georgia Pacific 6's, 1922. | 111 1/2 112 |
| Georgia Pacific 2d 6's, 1923. | 77 1/2 78 1/2 |
| Ga. Pacific Income 5's. | 31 1/2 34 |
| Petersburg Railroad Class A 6's, 1926-1940. | 104 |
| Petersburg Railroad Class B 6's, 1926-1940. | 105 |
| Rich. & Danville R. R. Gold 6's, 1915-1915. | 115 |
| West. N. Car. R. R. Gold 6's, 1914. | 100 |
| Northwestern N. Car. R. R. 1st 6's. | 103 103 |
| Atlanta & Charlotte R. R. Stock. | 96 1/2 97 1/2 |
| Salooners, opp. Lowell Depot, 90 Causeway St., Boston. | ... |

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*Means machinery is wanted, particulars of which will be found in "Machinery Wanted" columns.

In correspondence relating to matters reported in this paper, it will be a favor if it is stated that the information was gained from the MANUFACTURERS' RECORD.

ALABAMA.

Berryville—Saw Mill.—A. G. Parker & Co. are rebuilding their saw mill recently burned.

Bessemer—Bottling Works.—The Bessemer Steam Bottling Works will add a 10-ton ice machine to its plant, as lately stated.

Birmingham—Iron Furnace.—It is stated that the De Bardeleben Coal & Iron Co. has blown in its King John furnace.

Birmingham—Cotton Tie Factory.—The organization of a stock company to establish a cotton tie factory is talked of.

Birmingham—Marble Works.—The Alabama Marble & Stone Co. will put new machinery in its marble works, as lately reported.

Birmingham—Coal Mines, &c.—B. J. and T. E. Dryer have incorporated the Dryer Coal Co. with a capital stock of \$10,000 for the purpose of mining coal, etc.

Cunningham—Coal Mines.—The Milner Coal & Railroad Co. of Birmingham, will, it is reported, open coal mines at Cunningham.

Eufaula—Cotton Mill.—The Eufaula Cotton Mills will, it is reported, double the capacity of its cotton mill.

Florence—Ice Factory.—The Sweetwater Ice & Coal Co. will erect, it is reported, a 20-ton ice factory.

Fort Mitchell—Saw Mill.—B. M. Hearn has rebuilt his saw mill, recently reported under Seal as burned.

Fort Payne—Lime Works.—The Stoddard-Carr Lime Co., mentioned in last issue, is enlarging its lime works.

Fort Payne—Stove Works.—The Fort Payne Stove Works, with W. P. Rice as president; F. H. Tohey, vice-president, and W. P. Hemphill, secretary, and a capital stock of \$60,000, has been organized, and, it is stated, purchased and will operate the Fort Payne Coal & Iron Co.'s stove works.

Fort Payne—Coal Mines.—The Fort Payne Coal & Iron Co. has put new machinery in its coal mines, as stated in last issue.

Guntersville—Cotton Gin.—Miller Bros. are reported as erecting a cotton gin at Reedbrake.

Huntsville—Pulp Mill.—The American Fibre Association, of New York city, will erect the pulp mill mentioned in last issue. It will manufacture paper pulp from cotton-seed hulls.

Tredegar (P. O. Jacksonville)—Cotton Mill.—A syndicate has been investigating with a view to erect a 50,000-spindle cotton mill.

Lake View—Iron Mines—Major Miner is, it is stated, developing iron mines on Red Mountain. Opelika—Bottling Works—The Opelika Bottling Works will, it is stated, double the capacity of its bottling works.

Opelika—Grist Mill, &c.—The Opelika Milling Co. is reported as erecting a grist mill and as to put in an electric-light plant.

Piedmont—Saw Mill, &c.—Wilson & Waring will put new machinery in their saw and planing mill.*

Powdery—Ice Factory.—John Manning has, it is stated, received contract for the erection of a \$50,000 ice factory from a Birmingham stock company.

Tecumseh—Iron Mines.—McNamara Bros. are, it is stated, developing iron mines near Tecumseh.

ARKANSAS.

Eureka Springs—Artesian Well.—A stock company will be organized, it is reported, to sink an artesian well.

Hot Springs—Gas Works.—The Hot Springs gas works are, it is stated, being improved.

FLORIDA.

Arcadia—Artesian Well.—Reed Brothers have, it is stated, received contract for sinking an artesian well.

Bartow—Packing-house, &c.—Efforts are being made to organize a stock company for the purpose of erecting the packing-house, cold storage and refrigerating plant recently mentioned.

Chipley—Saw Mill.—The Hagerman Saw Mill Co., of Jacksonville, will, it is stated, move its saw mill to Chipley.

Dinsmore—Saw Mill.—Hilliard & Sons, of Hilliard, are reported as moving their saw mill to Dinsmore.

Fernandina—Packing-house.—The Bell River Packing Co. will, it is stated, put machinery for the manufacture of cans in its packing-house.

Florida—Phosphate Lands.—It is stated that German capitalists have secured options on phosphate lands in Florida, for future development.

Homeland—Phosphate Mines.—Isaac Whitaker is reported as having sold his phosphate mines to a London (Eng.) syndicate for \$500,000.

Jacksonville—Lumber Mill, &c.—The Columbia City Land & Lumber Co. will probably increase its capital stock to \$150,000.

Jacksonville—Lumber Mill.—The Branford Lumber Co. will probably increase its capital stock to \$100,000.

Kissimmee—Bottling Works, &c.—Morgan & Town are, it is stated, improving their bottling works, putting in corn mill and sinking an artesian well.

Lafayette County—Phosphate Mines.—An Ocala company has, it is stated, purchased the Steinhardt & Cook's Hammock phosphate lands, consisting of 20,000 acres, for \$500,000.

Lakeland—Ice Factory.—The establishment of an ice factory is talked of.

Lakeland—Electric-light Plant.—It is stated that H. C. Sloan will establish an electric-light plant.

Leesburg—Ice Factory.—The Leesburg Ice Co. will, it is reported, put additional machinery in its ice factory.

Madison—Bakery.—A bakery will, it is reported, be established.

Ocala—Phosphate Mine.—A Vicksburg (Miss.) syndicate has, it is stated, purchased a half interest in a phosphate mine in Marion county, and will organize a stock company to develop it.

Pemberton—Phosphate Mine.—Messrs. Walton & Whann, of Wilmington, Del., are, it is reported, developing a phosphate mine near Pemberton.

St. Augustine—Brush Factory.—Cook & Libby have, it is stated, patented machinery for the manufacture of palmetto brushes, and will put same in their woodworking factory.

Tarpon Springs—Water Works, &c.—A. P. K. Safford, G. B. Johnson, J. C. Fromme and others have incorporated the Tarpon Springs Irrigation & Development Co. with a capital stock of \$250,000 for the purpose of constructing water works, &c.

Titusville—Electric-light Plant.—The \$10,000 stock company, recently mentioned, has been organized as the Titusville Electric Light Co., and proposes to erect an electric-light plant. S. F. Gray is secretary.

GEORGIA.

Athens—Paper Bag Factory.—The Southern Paper Bag Co. has been organized and started the manufacture of paper bags. The capital stock is \$50,000.

Atlanta—Police Signal System.—The Gamewell Fire-alarm Telegraph Co., of New York city, has received contract at about \$11,000 to construct the police signal system recently reported.

Brunswick—Sash, Door and Blind Factory.—A. Hughes will organize the \$50,000 stock company to erect the sash, door and blind factory mentioned in last issue.

Brunswick—Machine Shops.—The East Tennessee, Virginia & Georgia Railroad Co. (office, Knoxville, Tenn.) will, it is stated, erect machine shops in Brunswick.

Buena Vista—Brick-yard.—The Buena Vista Improvement Co., reported lately, has already a brick yard in operation.

Carrollton—Electric-light Plant, &c.—D. F. New is reported as erecting a woodworking factory and planing mill and as putting in an electric-light plant.

Cedartown—Mines, Timber Lands, etc.—E. C. Mobley, H. N. Van Devander, J. F. Mobley and

others have incorporated the Southern Mining & Improvement Co. to develop mines, quarries, timber lands, etc. The capital stock is \$25,000.

Cedartown—Iron Lands—The Cedartown Land & Improvement Co., recently reported, has purchased, it is stated, 750 acres of the Peek iron lands.

Cedartown—Coffin and Furniture Factory.—J. K. and F. A. Milam, J. K. Barton and others will erect, it is reported, a factory 50x100 feet for the manufacture of chairs, coffins and furniture.

Columbus—Flour Mills, etc.—G. W. Woodruff, A. C. Prather, T. M. Foley and others have incorporated the Empire Mills Co. with a capital stock of \$150,000 for the purpose of buying and operating the Empire Flour Mills, etc.

Dahlonega—Gold Mine.—The Dahlonega Gold Mining & Milling Co. has, it is stated, put additional machinery in its gold mine.

Dahlonega—Gold Mines.—It is stated that R. R. Asbury is organizing a stock company to develop gold mines.

Dalton—Brick yard.—The Dalton Brick Co. has been organized and will, it is stated, establish a brick-yard.

Darien—Artesian Well.—It is stated that another artesian well will be sunk.

Gainesville—Ice Factory, etc.—The Southern Fish Co. will probably erect the ice factory and cold-storage warehouse recently mentioned.

Irwinton—Publishing.—A stock company is being organized, it is reported, to publish a newspaper.

Macon—Distillery.—A. Ullman has doubled the capacity of his whiskey distillery.

Macon—Fertilizer Factory.—The Macon Fertilizer Co. has been organized with R. E. Park, president, and J. F. Coates, manager.

Macon—Water Works, etc.—Syracuse (N. Y.) capitalists are investigating with a view of purchasing the entire plant of the Macon Gas Light & Water Co. for the sum of \$175,000.

Milledgeville—Laundry.—A stock company has been organized with S. Barrett as president, and J. C. Lynes, secretary, to establish the steam laundry lately mentioned. The capital stock is \$2,500.

Paulding County—Milner & Milner have started their saw mill, reported in last issue as burned.

Savannah—Crematories.—Two garbage crematories will probably be erected by the city.

Savannah—Bagging Factory.—C. B. Warrand will endeavor to organize a \$50,000 stock company to erect a factory for the manufacture of bagging from the saw palmetto.

Wahoo—Gold Mines.—S. S. Smith has purchased gold mining property for a stock company which will probably develop it.

Washington—Electric-light Plant.—Contract has been let for the erection of the electric-light plant, as recently stated, by the Excelsior Manufacturing Co.

Wishart—Saw Mill.—G. V. Gress has erected, it is stated, a saw mill, and put in an electric-light plant.

KENTUCKY.

Aberdeen—Bridge.—John Griffith has received contract at \$2,007 50 to construct a bridge over Fishing Gut creek near Aberdeen.

Ashland—Leather Strap Works.—The National Leather Works, of Chicago, Ill., will, it is stated, move their leather strap factory to Ashland if favorable inducements are offered.

Beattyville—Soap Factory.—A soap factory is, it is stated, being erected.

Beattyville—Bridge.—Brandenburg & Roberts have contract for building the bridge across Crystal creek.

Bethel—Saw and Grist Mill.—Bard & Summers are reported as erecting a saw and grist mill on Bear creek.

Catlettsburg—Electric-light Plant.—The Carpenters Electric Light & Power Co. is, it is stated, erecting an electric-light plant.

Dayton—Electric-light Plant.—The Citizens' Electric Light Co., previously reported, has a capital stock of \$25,000.

Frankfort—Electric-light Plant.—The Allen-Bradley Co., of Louisville, will, it is stated, put an electric-light plant in its distillery.

Grissom's Landing—Distillery.—The T. J. Monarch distillery has, it is stated, been purchased by R. Monarch for \$10,000.

Henderson—Creamery.—T. B. Johnson is reported as erecting a creamery.

Louisville—Refrigerating Plant.—Milton Barkhouse, S. P. Graham, S. M. Williams and others have purchased, it is reported, the refrigerating plant of the Louisville Refrigerating Co. for \$9,250, and will probably organize a stock company to operate it.

Louisville—Cider and Vinegar Factory, &c.—J. P. Byrne, J. F. Althaus and G. A. Burkley have incorporated the Louisville Cider & Vinegar Works, with a capital stock of \$25,000, for the purpose of manufacturing cider, vinegar, &c.

Louisville—Electric-light Plant.—The Allen-Bradley Co. will, it is stated, put an electric-light plant in its distillery.

Maysville—Barrel Factory.—The Limestone Cooperage Co., reported in last issue, will start a tight barrel factory.

Middlesborough—Laundry.—The City Steam Laundry has purchased, it is reported, J. O. Fraze's steam laundry and will move his plant to its laundry. The company has a capital stock of \$10,000.

Middlesborough—Furniture Factory.—W. W. Dunning, James Brown and others have, it is stated, organized a stock company to start a furniture factory.

Newport—Land.—Samuel Bigstaff, F. H. Cloud, W. H. Mackoy and others have incorporated the Highland Park Land Co. with a capital stock of \$125,000.

Peach Orchard—Electric-light Plant, &c.—The Great Western Mining & Manufacturing Co. has put new machinery in its coal mines, as stated in last issue, and contemplates erecting an electric-light plant.

LOUISIANA.

Labadieville—Ice Factory.—The establishment of an ice factory is contemplated.

Lake Charles—Electric-light Plant.—The M. T. Jones Co. will, it is stated, put an electric-light plant in their lumber mill.

Lake Charles—Electric-light Plant.—M. C. Norris has, it is stated, put an electric-light plant in his lumber mill.

New Orleans—Electric-light Plant.—The Louisiana Electric Light Co. will enlarge and improve its electric-light plant, as stated in last issue.

Shreveport—Broom and Brush Factory.—The Shreveport Broom & Brush Works is reported as organized to establish a broom and brush factory.

MARYLAND.

Baltimore.—W. H. Roberts contemplates putting in a 40 horse-power boiler, J. W. McLaughlin & Co. a 30 horse-power boiler, C. Hohman & Sons a 100 horse-power boiler and V. G. Bloody a 100 horse-power boiler.

Baltimore—Car and Car-wheel Works.—It is reported that New York parties have been investigating with a view of establishing car and carriage works in South Baltimore.

Baltimore—Car Works.—The South Baltimore Car Works will double, it is reported, the capacity of its car works.

Cumberland—Rolling Mill, Steel Plant, &c.—It is stated that T. A. Hicks, W. C. Dickie and R. B. Sidell, of Philadelphia, Pa., have purchased the rolling mill, steel plant, machinery, &c., of the Crown & Cumberland Steel Co. for about \$42,000.

Guildford—Cotton Factory.—It is stated that the Gary Manufacturing Co. will rebuild its cotton factory lately reported as burned.

Hagerstown—Paint Mill.—The Rock Mineral Paint Co., of Cleveland, Ohio, is erecting a paint mill in Hagerstown, as recently reported. The building is to be 106x40 feet.

Hagerstown—Land.—Edward Stake, J. L. Nicodemus, A. P. Connor and others have incorporated the Citizens' Development Co. to purchase and improve land. The capital stock is \$800,000.

Laurel—Land Improvement.—A syndicate has purchased, it is reported, 234 acres of land near Laurel, will improve same and lay off into a new town to be called North Laurel.

Long Green—Paper Mills.—It is reported that the Baltimore Paper & Pasteboard Co., of Baltimore, with a capital of \$2,000,000, has secured options on 2,000 acres of land on both sides of the Gunpowder Falls, near Long Green, will construct a dam and erect mills for the manufacture of printing paper and straw board.

Ocean City—Land, &c.—A. E. Godeffroy and Norman McLean, of New York, N. Y.; E. H. Roe, of Easton, and others have incorporated the Syneputent Bay Land & Improvement Co. to purchase and improve lands, construct marine railways, &c. The capital stock is \$10,000.

Ocean City—New Town, &c.—R. G. Keene, of Baltimore, purchased the Stephan Taber estate mentioned in last issue, has organized the Syneputent Beach Co., and will, as stated, improve the land and build a new town, probably to be called Syneputent. The company contemplates the construction of water works.

Pocomoke City—Electric-light Plant.—The Pocomoke City Electric Light & Power Co. has been organized with E. G. Polk, president; W. S. Dickinson, vice-president, and F. H. Dryden, secretary, and purchased Young & Colburn's electric plant. The capital stock is \$10,000.

MISSISSIPPI.

Jackson—Excelsior, Spoke and Axe-handle Factory.—The establishment of an excelsior, spoke and axe-handle factory is contemplated. G. S. Green can give information.*

Natchez—Bridge.—A bridge will, it is stated, be built across the bayou at Pearl street.

Poss Christian—Land.—Chicago capitalists are reported as having purchased and as to improve 5,000 acres of land near Poss Christian.

Vicksburg—Saw Mills, &c.—T. Ouellette, W. Curphy, J. P. Roach and others have incorporated the Ouellette-Curphy Lumber Manufacturing Co. with a capital stock of \$30,000, for the purpose of operating saw mills, sash, door and blind factories, &c.

Vicksburg—Cotton Mill.—The erection of a \$50,000 cotton mill is talked of.

NORTH CAROLINA.

Bryson City—Insulator Factory.—Arthur & Lipscomb have increased their capacity for manufacturing insulators.

Charlotte—Ice Factory.—Fred Balcom, of Atlanta, Ga., will probably erect a 25 ton ice factory in Charlotte.

Danbury—Improvements.—A \$10,000 stock company has, it is stated, been organized to develop the Piedmont Springs property lately mentioned.

Durham—Bed-spring Factory.—A bed-spring factory will, it is stated, be established.

High Point—Land.—The High Point Development Co., with a capital stock of \$30,000, has been organized with J. T. Mallory, of Durham, as president; E. D. Steele, vice-president, and A. E. Tate, secretary. It is stated that the company has purchased 30 acres of the Russell property and will improve it.

Elizabeth City—Ice Factory.—E. E. Jackson, of Annapolis, Md., the Toadvine Lumber Co. and others will, it is reported, erect a \$35,000 ice factory.

Fayetteville—Machine Shops.—The Carolina Machine Co., lately reported as organized, has been incorporated.

Gastonia—Cotton Mill.—The Gastonia Manufacturing Co. is reported as putting new machinery in its cotton mill.

Greensboro—Hosiery Mill.—L. F. Ross contemplates the establishment of a hosiery mill.

High Point—Mattress Factory.—C. F. Call contemplates establishing a mattress factory.*

Jarrets—Insulator Factory.—Keener & Co. contemplate the manufacture of insulators.

Marion—Gold Mines.—The Vein Mountain Gold Mining Co. is reported as opening a gold mine near Marion.

Marion—Gold Mine.—It is stated that the Saler Gold Mining Co., recently reported, has commenced the development of gold mines near Marion.

Murphy—Talc Mine.—William Beal is developing a talc mine near Murphy.

New Berne—Laundry.—Howard & Green will, it is stated, establish the steam laundry lately mentioned.

Norwood—Land, etc.—C. N. Bennett, S. J. Pemberton and C. D. Bennett have, it is stated, organized a land improvement company.

Oxford—Cotton Factory.—The Oxford Land, Improvement & Manufacturing Co. has, it is stated, contracted for the location of a \$100,000 cotton factory.

Oxford—Prizey.—Pinkney Meadows is, it is stated, erecting an addition to his prize tobacco factory.

Southport—Lumber Mills.—Henry Daniel, J. A. Bell, A. E. Stevens and others have incorporated the Southport Lumber Co. to erect lumber mills, etc. The capital stock is \$10,000.*

Windsor—Cotton Factory.—A co-operative stock company is being organized, it is stated, to establish a cotton factory.

SOUTH CAROLINA.

Aiken—Kaolin Mines.—C. E. Sauron is president; W. G. Allen, vice-president, and T. G. Lockwood, secretary, of the Southern Kaolin Co., recently reported under Graniteville, which is the company's shipping point.

Bennettsville—Oil Mill.—The Marlboro Cotton Oil Co. is reported as having improved its cotton seed oil mill.

Blackburg—Garnet Mines.—J. W. Seacrest is developing garnet mines.*

Charleston—Canning Factory.—The establishment of an oyster, fruit and vegetable canning factory is talked of.

Greenville—Bottling Works.—The Robert Porter Brewing Co., of Alexander, Va., is reported as to erect new bottling works in Greenville.

Greenville—Cider and Vinegar Factory, etc.—The Augusta Manufacturing & Canning Co. will, it is stated, erect the cider and vinegar factory lately mentioned, and also a canning factory.

Greenville—Cotton Factory.—The Batesville Cotton Factory has, it is stated, put new machinery in its cotton factory.

Greenville—Bridge.—L. K. Clyde will receive bids until October 15 for the construction of a bridge over Saluda river at Holliday's Ford.

Orangeburg—Electric-light Plant.—E. F. Slater is president; O. R. Lowman, vice-president, and Charles Copes, secretary, of the Orangeburg Electric Light & Power Co., recently reported. The capital stock is \$3,000.

Seneca—Oil Mill.—The Newberry Oil & Fertilizer Co., of Newberry; R. V. H. Lowrey, of Newberry, and W. E. Memons, of High Falls, N. C., contemplate erecting the cotton-seed oil mill lately mentioned.

Spartanburg—Cotton Gin.—T. B. Martin is, it is stated, improving his cotton gin.

Spartanburg—Electric-light Plant.—The Spartanburg Gas, Electric Light & Power Co. will increase its capital stock to \$75,000, as lately stated.

Sunter—Electric-light Plant.—The Sunter Electric Light Co. will, it is stated, increase the capacity of its electric-light works.

Yorkville—Buggy Factory.—The Carolina Buggy Co. will increase its capital stock to \$100,000.

TENNESSEE.

Athens—Planing Mill.—Another planing mill is reported as to be erected.

Athens—Land, etc.—The Athens Town Co. has been organized for the purpose of optioning and improving land.

Athens—Marble Works, etc.—Marble works and a brick and tile factory will probably be established. The Athens Mining & Manufacturing Co. can give information.

Benton—Stone Quarry.—A lithographic stone quarry will probably be opened on the farm of Joseph Cate, near Benton.

Bristol—Bridge.—Contract has been awarded for the construction of the bridge over Beaver creek.

Bristol—Ice Factory.—S. R. Ferguson and J. W. Dinnwiddie will, it is stated, erect an ice factory.

Cardiff—Land.—The Nixon Addition Land Co. has been organized with H. H. Little as president, and E. D. Putney, secretary, and is, it is stated, improving 586 acres of land adjoining Cardiff.

Cardiff—Ice Factory.—It is stated that an ice factory will be erected on the Nixon addition.

Cardiff—Saw Mill.—C. R. Stranger and C. H. Young are reported as erecting a saw mill near Pine Orchard.

Chattanooga—Railroad Supply Works.—It is stated that a \$30,000 stock company has been organized for the purpose of erecting a foundry to manufacture railroad frogs, switches and other supplies.

Chattanooga—Real Estate.—J. P. Richardson, W. W. Gordon, S. M. Patton and others have incorporated the Richardson Investment Co. with a capital stock of \$500,000 for the purpose of dealing in real estate.

Chattanooga—Oil and Grease Factory.—The Southern Oil & Grease Co. will, it is stated, increase the capacity of its oil and grease factory.

Chattanooga—Tool Factory.—The Chattanooga Tool Co. has, it is stated, improved its tool factory.

Chattanooga—Coal Mines.—J. G. Taylor & Co. and others have, it is stated, purchased the estate of C. B. Duncan, consisting of 164,000 acres of coal lands in Cumberland and Putnam counties.

Chattanooga—Ice Factory.—The Big Spring Ice Co., mentioned in last issue, will add a storage warehouse with endless chain elevator to its ice factory.

Chattanooga—Ice Factory.—The Lookout Ice & Cold Storage Co., mentioned in last issue, contemplates increasing capacity of its ice factory.

Chattanooga—Machine Shop.—The Chattanooga Machinery Co., mentioned in last issue, is doubling the capacity of its machine shop, but will not build a foundry at present.

Chattanooga—Furniture Factory, &c.—Loomis & Hart Manufacturing Co. has put new machinery in its furniture factory, as reported in last issue, and will put in an electric-light plant.

Dante—Canning Factory.—Morrow & Coupland, of Seaford, Del., are reported as organizing a stock company to erect a canning factory in Dante.

Dayton—Flour Mill.—Keith & Percy are reported as erecting a flour mill in North Dayton.

Dayton—Bridge.—A bridge is reported as being built over the Abel Spring branch.

Dayton—Mineral Lands, etc.—The Tennessee Industrial Land Co. has been organized, it is stated, by Chicago (Ill.) parties and purchased over 1,000 acres of mineral and other lands in the vicinity of Dayton and will improve same. W. Englewood can give information.

Dayton—Bridges.—It is stated that W. Englewood will receive bids for the construction of two iron bridges.

Dunlap—Coal Mines.—The Dunlap Coal, Iron & Railroad Co. is opening the Brush creek coal mines, mentioned in last issue under (Brush Creek.)

East End—Carriage and Wagon Factory.—J. C. Roberts is reported as erecting a carriage and wagon factory.

Gibson—Plow Factory.—The Gibson Plow Works will, it is stated, build an addition to its plow factory.

Humboldt—Canning Factory.—It is stated that a stock company is being organized to erect a canning factory.

Johnson City—Bottling Works, &c.—G. R. Brown has, it is stated, organized a stock company to erect bottling works and also to erect an ice machine.

Knoxville—Brewery.—It is stated that the Knoxville Brewing Co., previously reported as increasing capital stock, will erect a new brewery with a daily capacity of 25,000 barrels.

Knoxville—Stove Foundry.—A Portsmouth (Ohio) party is investigating with a view to erecting a steel cooking-range foundry in Knoxville.

Knoxville—Water Works.—A stock company is, it is reported, being organized to purchase the Tillery farm near Knoxville, and to lay a pipeline to convey spring water to West and North Knoxville.

Lenoir—Wood Pulp Factory.—It is stated that the Lenoir City Wood Pulp Co. has been organized for the purpose of moving to Lenoir the wood pulp factory of the American Wood Pulp Co., of Philadelphia, Pa.

Loudon—Marble Quarry.—R. M. Johnston is president; L. E. Rees, vice-president, and T. P. Rockafellow, secretary, of the Loudon Quarry Co., previously reported. The capital stock is \$5,000.

Morristown—Land.—W. E. Scarritt, C. H. Allison and others have chartered the Grotto Land Co., and, it is stated, optioned 1,000 acres of land near Morristown.

Morristown—Water Works.—It is stated that J. G. Martin has awarded contract to E. D. Bolton, of New York, N. Y., for the construction of the water works previously reported.

Nashville—Packing House.—W. H. Silberhorn, A. S. Garretson and others have incorporated the Nashville Packing Co. to erect the \$1,000,000 pork packing-house previously mentioned.

New Providence—Tobacco Factory.—Mr. J. H. Hamm is reported as enlarging his tobacco factory.

Rockwood—Stove Foundry.—It is stated that the Rockwood Stove Works, with a capital stock of \$75,000, has purchased and will operate the Mima stove foundry.

Rockwood—Stove Works.—L. A. Ostrom, of Cincinnati, Ohio, is investigating with a view to establish stove works in Rockwood.

South Pittsburg—Water Works.—The South Pittsburg City Water Co., lately mentioned, contemplates the erection of a new reservoir.

South Watauga—Planing Mill.—A planing mill will probably be erected.

South Watauga—Saw Mill, etc.—C. F. Camp, of Williamsport, Pa., is erecting the saw mill recently mentioned. An ice factory may be erected in connection.

Springfield—Saw Mill.—W. H. Toon has, it is stated, erected a saw mill.

Sweetwater—Woolen Mill.—The Sweetwater Woolen Mills will double the capacity of its woolen mill, as stated in last issue, and may put in an electric-light plant.*

TEXAS.

Bolton—Flour Mill.—A stock company is reported as being organized to erect a roller flour mill.

Brownwood—Chair Factory.—A chair factory is reported as being erected near Brownwood.

Chireno—Bridge.—Flournoy & Foote are constructing the bridge over Attoyoc river, lately mentioned.

Dallas—Foundry and Machine Shop.—S. R. Haskell, of Birmingham, Ala., is investigating with a view to locate in Dallas a brass and iron foundry and machine shop.

Eddy—Cotton Gins.—Two cotton gins have been erected, it is reported.

Flatonia—Water Works.—The construction of a system of water works is contemplated.

Fort Worth—Machine Shops.—The Union Pacific Railway Co. (office, Boston, Mass.) will, it is stated, erect machine shops at Fort Worth to cost \$1,000,000.

Gainesville—Canning Factory.—The erection of a canning factory by the Cooke County Horticultural Society is talked of.

Greenville—Electric-light Plant.—Several companies have made propositions to erect the electric-light plant previously mentioned.

Hartley—Cement Deposit.—A company contemplates working a cement deposit near Hartley.

Henrietta—Electric-light Plant, &c.—The Henrietta Improvement & Water Co., recently reported, will erect the water works, and also an electric-light plant and ice factory.

Hilton—Grist Mill and Gin.—A cotton gin and grist mill have, it is stated, been erected.

Jefferson—Saw Mill.—A saw mill has been erected at Little Cypress, it is reported.

Lodi—Saw and Planing Mill.—Dunn, Wurtsbaugh & Rand are erecting the saw and planing mill recently mentioned.

Midlothian—Bridge.—A bridge will be built, it is reported, over Soap creek, near Midlothian.

Round Timber—Bridge.—An iron bridge will, it is stated, be built over Spring creek in Baylor county.

San Antonio—Land.—Omaha (Neb.) capitalists have, it is stated, purchased 900 acres of land near San Antonio for \$100,000, and will improve same.

San Antonio—Fire-alarm System.—The Gaynor Electric Co., of Louisville, Ky., has received contract at \$17,250 to construct the fire-alarm system previously reported.

Terrell—Artesian Well.—An artesian well will be sunk at the water works, as lately rumored.

Tyler—Ice Factory.—Simons & Brown will operate the ice factory mentioned in last issue.

Vernon—Foundry and Machine Shops.—The establishment of an iron foundry and machine shops is talked of.

Waco—Oil Mills.—The organization of a stock company to erect cotton-seed oil mills is projected.

Woolam—Water Works.—It is stated that the San Antonio company previously mentioned has received contract to construct the water works.

VIRGINIA.

Basic City—Sash, Door and Blind Factory, &c.—The Basic City Lumber & Coal Co., recently mentioned, will manufacture sash, doors, blinds, &c., and expect to erect a saw mill.

Bedford City—Spoke Factory.—J. M. Berry is reported as having purchased the Bedford City spoke factory for \$8,000.

Buchanan—Land.—The Arcadia Investment Co. has been organized with S. W. Jamison, president; F. B. Kemp, vice-president, and L. E. Evans, secretary. The capital stock is \$50,000.

Buchanan—Land.—The Buchanan Investment Co. has been organized with J. A. Jamison, president; F. M. Williams, vice-president, and L. E. Evans, secretary, for the purpose of dealing in land, &c. The capital stock is \$30,000.

Buena Vista—Saddle and Harness Factory.—The Wilbourn Saddle & Harness Factory will, it is stated, enlarge the capacity of its saddle and harness factory.

Buena Vista—Iron Furnace, &c.—It is stated that the Loch Laird Estate & Mineral Co., previously mentioned, has secured the building of an 80 to 100 ton iron furnace, and the erection of fancy tile works, paint works and spoke and hub factory on its property.

Charlottesville—Brick Works.—A stock company will, it is stated, be organized for the purpose of establishing brick works.

Charlottesville—Woolen Mill.—J. R. Emsley, of Philadelphia, Pa., will operate the woolen mill reported in last issue.

Glasgow—Brick-yard.—H. Jordan, of Staunton, Va., will, it is stated, establish a brick-yard in Glasgow.

Glasgow.—The Rockbridge Co. has increased its capital stock to \$5,000,000, an English syndicate supplying \$1,500,000, as stated in last issue.

Gordonsville—Canning Factory, &c.—The Piedmont Manufacturing Co., reported in last issue, has been incorporated and will, it is stated, erect a factory for the manufacture of brooms and the canning of fruit.

Gordonsville—Mineral Land.—The land and improvement company previously mentioned as being organized has been incorporated with N. W. Bowe, president; W. L. Fleming, vice-president, both of Richmond, and C. B. Linney, secretary. The capital stock is \$750,000. The company has secured several thousand acres of land, including the Gordon mountain, and will, it is stated, improve same, develop lead and zinc mines, &c.

Greenville—Flour Mill.—S. D. McKee and others are endeavoring, it is stated, to organize a stock company for the purpose of erecting a flour mill.

Howardsville—New Town.—It is stated that the Virginia Steel, Iron & Slate Co., of Richmond, will build a new town, near Howardsville, to be known as Logan City.

Ivanhoe—Land, &c.—The West Ivanhoe Land & Improvement Co. has been incorporated with J. D. Waugh, president, and James Anmann, secretary. This company has, it is stated, purchased the E. G. Painter farm of 218 acres near Ivanhoe.

Liberty Furnace (P. O. at Columbia Furnace)—Iron Furnace.—The Liberty Iron Co., H. H. Yard, of Philadelphia, Pa., president, is constructing a 50-ton iron furnace.

Luray—Iron Lands, &c.—The Luray Mining & Mineral Co., reported in last issue, owns about 5,000 acres of manganese and iron lands, which it will soon develop. The minimum capital stock is \$100,000.

Luray—Woodenware Factory.—The Luray Manufacturing Co., reported in last issue, will manufacture woodenware.

Luray—Manufacturing.—It is reported that a stock company has purchased the Hope Mills and will remodel and operate same.

Lynchburg—Coal and Iron, etc.—The Crane's Nest Coal and Iron Co. has been chartered with F. T. Lee, president; G. V. Latchie's, of Abingdon, vice-president, and W. King, Jr., secretary, for the purpose of developing coal, iron and timber lands in Wise, Dickinson, Scott and Russell counties. The capital stock is \$2,000,000.

Marion—Wagon Factory.—Look & Lincoln have put new machinery in their wagon factory, as reported in last issue.

New Castle—Iron Furnace, Rolling Mill, &c.—C. C. Lewis, Frank Woodman, J. S. McDonald and others have purchased 1,500 acres of land adjoining New Castle and organized the Junction City Land & Improvement Co., with a capital stock of \$25,000, to develop the land. It is stated that an iron furnace, rolling mill and stove foundry will be built.

New Castle—Dyeing Establishment, &c.—Capt. Spitzer and others, of Richmond, are reported as organizing a company to erect a steam dyeing and cleansing establishment. It is stated that site has been purchased.

Norfolk—Land.—A West Virginia syndicate has purchased, it is reported, the Northbrook tract of 108 acres of land for \$115,000, and will lay it off into town lots.

Norfolk—Improvements, &c.—The Norfolk Investment Co. has been incorporated with E. V. White as president; T. J. Nottingham, vice-president, and D. Lowenberg, secretary, to purchase and improve property, &c. The capital stock is \$10,000.

Petersburg—Tinware Factory.—The Seward Tin Works Co., with a capital stock of \$20,000, has been organized with Simon Seward as president; W. H. Seward, vice-president, and J. W. Seward, secretary, for the purpose of manufacturing tinware, &c.

Pulaski City—Sandstone Quarry.—The Pierce Investment Co. is developing the sandstone quarry lately mentioned.

Richmond—Publishing, &c.—The Everett Waddey Co. has been incorporated with Everett Waddey as president, and D. M. Hall, secretary, for the purpose of publishing, printing, &c. The capital stock is \$30,000.

Richmond—Land.—Decatur Axtell, H. T. Wickham, G. W. Stevens and others have incorporated the Chesapeake & Ohio Land Co. with a capital stock of \$25,000.

Richmond—The James River Colonization & Improvement Co., incorporated by the last legislature, has been organized with Thomas Pindexter, president; W. A. Parsons, vice-president, and E. D. Champlin, secretary.

Roanoke—Land.—The Woodland Park Land Co. has been incorporated with J. S. Simmons as president, and E. A. Parsons, vice-president and secretary, and has, it is stated, purchased Woodland Park, lately mentioned.

Roanoke—Land.—The Riverton Land Co. has been chartered with a capital stock of \$300,000 for the purpose of dealing in land, etc.

Roanoke—Street Improvements, &c.—The city is considering the issuance of \$500,000 of bonds for the improvement of its streets and sewers.

Roanoke—Gas and Water Works.—The Roanoke Gas & Water Co., recently mentioned, is constructing a gas-holder with a capacity of 100,000 cubic feet, and extending its water mains.

Salem—Machine Works, &c.—Edward Corbett, of Washington, D. C., is endeavoring to organize a \$100,000 stock company to erect at Salem machine shops, iron foundry, &c., for the manufacture of flour mill machinery.

Shendun—Sash, Door and Blind Factory.—Entsler Bros. are erecting the sash, door and blind factory lately mentioned.

Staunton—Real Estate.—The Southern Investment Co. has been incorporated with G. C. Jordan, president; Asher Ayers, vice-president, and J. D. Pickard, secretary. The capital stock is \$100,000.

Suffolk—Kindling-wood Factory.—The Suffolk kindling-wood factory, recently reported as burned, will probably be rebuilt.

Tacoma—Electric-light Plant.—The Thomson-Houston Electric Co., of Boston, Mass., has, it is stated, received contract for erecting the electric-light plant lately mentioned.

Tazewell C. H.—Coal Mine.—A stock company has been organized with James O'Keefe, president, and Ralph Izard, secretary, and will open, it is reported, a coal mine in Russell county.

Vinton—Planing Mill.—Creasy & Kirby are erecting a planing mill.

WEST VIRGINIA.

Belmont—Brewery.—The Belmont Brewing Co. has secured site and will, it is stated, erect a new brewery.

Belmont—Oil Wells.—The Parkersburg and Wheeling parties, recently mentioned as leasing the Ruttencutter land, have organized the Belmont & Eureka Oil Co. with G. H. Leatherbee as president, and J. W. Vandervoet, secretary.

Charleston—Oil Well.—The Messrs. Becker contemplate sinking an oil well.

Charleston—Land.—J. F. Brown, M. Jackson, A. M. Scott and others have chartered the West Charleston Improvement Co. with a capital stock of \$500,000 for the purpose of purchasing and improving 300 acres of land near West Charleston.

Elkins—Coal Mines, etc.—S. B. Elkins, H. G. Davis and others have incorporated the Randolph Coal & Coke Co. with a capital stock of \$5,000.

Hinton—Electric-light Plant.—A company has, it is stated, been chartered for the purpose of erecting an electric-light plant.

Huntington—Patent Medicine Factory.—It is stated that a patent medicine factory in Weston will be moved to Huntington. The secretary Board of Trade can give information.

Keyser—Furniture Factory.—M. G. Richardson & Bro. contemplate erecting the furniture factory mentioned in last issue.*

Morgantown—Grain Elevator.—The Victor Mills Co. will, it is stated, erect a 40,000-bushel grain elevator.

Parkersburg—Wire Nail Factory.—A company has, it is stated, been organized for the purpose of establishing the nail factory recently mentioned, to manufacture the Hastings steel wire nail.

Wheeling—Oil Wells.—A stock company has been organized with J. H. Hobbs, president, and T. O. Edwards, secretary, for the purpose of sinking oil wells. The capital stock is \$200,000.

Wheeling—Oil and Gas Wells.—F. C. Gaylord, of Weston; E. E. Baldwin, C. H. Ahrens and others have incorporated the Travelers' Oil & Gas Co. for the purpose of sinking oil and gas wells.

Wheeling—Oil and Gas Wells.—The Bartlett Oil & Gas Co. has been incorporated.

Wheeling—Publishing.—The News Publishing Co. has been incorporated to publish a newspaper.

Wellsburg—Clay Mines.—T. W. Carmichael and W. C. Jacob, of Wellsburg, have, it is reported, purchased 10 acres of clay lands near Wellsburg, and will organize a \$50,000 stock company to develop same.

BURNED.

Bolton, Texas.—The cotton gin of Waldren & Moreroeth.

Charlotte, N. C.—The cotton gin of Hugh Boyce destroyed by an explosion.

Hamburg, S. C.—The cotton gin of John C. Hines. The estimated loss is \$3,000.

Kearse, S. C.—The saw and grist mill and cotton ginnery of J. Ritter & Son; estimated loss about \$5,000.

Meridian, Texas.—The cotton gin of William & Weeks; estimated loss \$2,800.

Mobile, Ala.—The power-house of the Mobile Coal Co.

Nashville, Tenn.—Five cottages; loss about \$12,000.

Palatine, W. Va.—The Marion Machine Works; reported loss \$15,000.

Pine Grove, Ky.—Jones & Gay's warehouse and the Newport News & Mississippi Valley Co.'s depot (office, New York city); loss about \$10,000.

Reddick, Fla.—Commander's saw mill near Reddick.

Building Notes.

Americus, Ga.—P. L. Holt contemplates erecting a three-story building, 52x100 feet, to cost \$7,000.

Archer, Texas.—The Baptists contemplate erecting a church.

Arkansas City, Ark.—Hotel.—The Kentucky and Arkansas Land & Industrial Co. is reported as erecting a 55-room hotel to cost \$20,000.

Baltimore, Md.—The congregations of St. John's Independent Methodist Church and St. John's Chapel will combine and build a new church. Rev. E. J. Green can give information.

Basic City, Va.—Mr. Gold, of Lancaster, Pa., will, it is stated, erect a business house to cost \$10,000.

Beeville, Texas.—A \$50,000 stock company will probably be organized by A. C. Jones and others to build a college.

Birmingham, Ala.—F. G. Shepard will erect a two-story brick house to cost \$5,000.

Birmingham, Ala.—It is stated that \$100,000 will be the cost of the First M. E. Church, previously reported.

Bristol, Tenn.—A branch of the Interstate Building & Loan Association of Columbus, Ga., has been organized with E. S. Kindrick, president, and J. L. C. Smith, secretary.

Brookland, D. C.—A. Goenner & Co., of Washington, have prepared plans for the erection of a two-story store and dwelling, 25x80 feet, to cost \$6,000.

Cardiff, Tenn.—A branch of the Mercantile Building & Loan Association of New York has been organized with H. C. Young, president; R. L. Callahan, secretary, and L. C. White, Jr., treasurer.

Charleston, Tenn.—The erection of a new police station is talked of.

Childress, Texas.—Hotel.—It is stated that the hotel previously mentioned is in course of erection, and will cost \$20,000.

Chipley, Fla.—Hotel.—T. E. Langston has prepared plans for a \$10,000 hotel for the Chipley Hotel Co.

Clifton Forge, Va.—Hotel.—B. D. Avis, general manager of the Clifton Forge Co., will receive proposals until October 1 for the erection of the new hotel previously reported as to be built.

Dalton, Ga.—W. Chamberlin, of Knoxville, Tenn., has received contract at \$26,000 to erect the courthouse previously mentioned.

Danville, Va.—C. H. Conrad, chairman school committee, will receive proposals until October 1 for the erection of a new school building.

Durham, N. C.—C. H. Norton has secured contract for the erection of the Trinity College, previously reported.

East Lake, Ala.—Solomon Palmer, of Montgomery, is organizing a \$60,000 stock company to build the college lately referred to.

Elkins, W. Va.—Hotel, &c.—The Valley Improvement Co. is erecting a hotel building to be 75x110 feet, and a bank building to be 50x80 feet. This hotel is probably the same as the one reported last week.

Gaston, N. C.—It is stated that the Gastonia Manufacturing Co. will erect two storehouses and five cottages.

Georgetown, Ky.—The Baptists will probably erect a new church.

Glasgow, Va.—The Glasgow Masonic Temple Association, with a maximum capital stock of \$100,000, has been incorporated with A. R. Courtney, president, and N. B. Isaacs, secretary, for the purpose of erecting a Masonic hall

Goodlettsville, Tenn.—The Louisville & Nashville Railroad Co. (office, Louisville, Ky.) contemplates erecting a new depot.

Gordonsville, Va.—Hotel.—It is stated that a land and improvement company, of which N. W. Bowe, of Richmond, is president, will erect a hotel near Gordonsville to be known as the Gordons Inn.

Goshen, Va.—The Goshen Central Construction Co. has been chartered with A. D. Payne, president, for building and loan purposes. The capital stock is to be not less than \$10,000 nor more than \$100,000.

Grape Vine, Texas.—Hotel.—It is reported that John Wallace will erect a hotel.

Griffin, Ga.—The Central Railroad & Banking Co. (office, Savannah, Ga.) contemplates erecting a new depot.

Johnson City, Tenn.—McDaniel & Stone, of Chattanooga, have secured contract for the erection of a building for Singiser & Chandler.

Knoxville, Tenn.—Hotel.—Peter Staub is president; W. W. Woodruff, treasurer, and S. B. Crawford, secretary, of a company formed for the purpose of erecting the large hotel previously referred to. Henry Cobbs, of Chicago, has prepared the plans.

Lancaster, S. C.—The Farmers' Alliance contemplates building a warehouse 100x20 feet.

Leonard, Texas.—A Masonic hall 30x100 feet is reported as to be erected.

Little Rock, Ark.—T. E. Murrell will erect a two-story residence to cost \$5,000.

Macon, Ga.—The erection of a new city hospital is talked of. Mayor Price can give information.

Meridian Miss.—W. H. Curtis, clerk board of supervisors, will receive proposals until October 1 for the erection of an addition to the courthouse of Lauderdale county.

Morgantown, W. Va.—The contract price for the new courthouse mentioned last week is \$53,478. Orders for heating apparatus and other machinery have been placed. G. W. L. Mayers, of Fairmont, has contract as stated.

Moultrieville, S. C.—Hotel.—The erection of a new hotel is agitated.

New Castle, Va.—The erection of a new school building is probable. P. V. Jones can give information.

New Castle, Va.—A Catholic church will probably be erected.

Ocean City, Md.—Hotel.—The Synepuxent Beach Co. contemplates the erection of a hotel and other buildings.

Oneonta, Ala.—It is reported that the Baptists will erect a church.

Opelika, Ala.—The Opelika Milling Co., mentioned elsewhere in this issue, will, it is stated, build a warehouse.

Parkersburg, W. Va.—The State Building Association has been organized with H. C. Jackson, president; Robert Alexander, secretary, and C. H. Shattuck, treasurer.

Quanah, Texas.—Rempe & Co., of Dallas, have, as recently stated, received contract to erect the Quanah Hotel Co.'s three-story hotel.

Quitman, Ark.—A \$15,000 school building is reported as to be erected.

Red Springs, N. C.—It is probable that a manufacturers' building, loan and trust association will be organized.

Reisterstown, Md.—William Keyser, of Baltimore, will erect an Episcopal church, as stated last week, to cost \$12,500.

Reidsville, Ga.—Mr. Lendrum, of Louisville, Ky., has secured contract at \$5,400 for the erection of a new jail.

Richlands, Va.—The erection of a \$10,000 brick school building is talked of.

Richmond, Va.—The Richmond Building, Loan & Abstract Association has been chartered with a maximum capital stock of \$500,000. S. H. Bowman is president; G. W. Brown, treasurer, and J. E. Taylor, secretary.

Roanoke, Va.—The Roanoke Building & Investment Co. will, it is stated, erect a school-house 50x45 feet.

Sandy Ridge, N. C.—The Methodists contemplate the erection of a new church 40x60 feet. Rev. J. T. Bagwell can give information.

Seymour, Texas.—Haggart & Sanguinet, of Fort Worth, have secured contract for the erection of a new opera house to cost \$25,000 for the Seymour Opera House Co.; also contract for 6 store buildings.

Shelby City, Ky.—W. R. Goff will, it is reported, build a two-story tobacco warehouse 100x40 feet.

South Pittsburg, Tenn.—W. B. Jarrett is reported as to erect a residence on the corner of Holly avenue and Fourth street.

Thomasville, N. C.—The erection of a new hotel is agitated.

Washington, D. C.—Joseph Davis will erect a dwelling to cost \$5,500; G. W. Boyd, a dwelling and store to cost \$9,000 and have steam heating; plans have been prepared by Barr, Simpson & Andrews for the erection of a four-story dwelling for A. C. Tyler, to cost \$38,250—electric bells and steam or hot water heating will be used; by A. Goenner & Co., for a two-story dwelling, to cost \$5,000, and by G. S. Cooper, for five dwellings, 14x16 feet each, to cost \$6,000, for J. C. Davidson.

Wheeling, W. Va.—N. S. Berlew and Frank Woodman are reported as to erect a new opera-house.

Wilmington, N. C.—Jacob S. Allen intends building four stores to have iron columns, galvanized iron cornices and iron beams.*

Winona, Miss.—J. C. Sheppard, of Meridian, has secured contract for the erection of a \$10,000 school building.

Yoakum, Texas.—The San Antonio & Aransas Pass Railway Co. (office, San Antonio) will, it is stated, build a new depot.

Growth of Cotton Manufacturing South.

Development of the cotton manufacturing industry in the South seems to be going on at a more rapid pace than ever before. Recent reports speak of the phenomenal growth of the great manufacturing center in Spartanburg county, S. C., which now alone represents an equipment of more than 200,000 spindles, and turns out a class of goods varying from the coarsest to the finest grades, the latter being able to compete with the best product of the New England mills. One of the largest of the corporations in this section, the Spartan Mill, is just about completing the erection of its plant, and, with a capital stock of \$1,000,000, will soon be in operation. Its equipment consists of 35,000 spindles and 1,100 looms, with room for 5,000 more spindles. It is situated in the midst of the cotton-growing region, and when in full operation will be able to consume a third of the cotton raised in that county. This, like many of the other mills in that locality, is built with New England capital, indicating clearly that the advantages of a close proximity of the factory and farm have begun to be appreciated by the shrewd business men of the North. Thus far the Southern mills have been fully able to hold their own with their New England competitors, as their general prosperity shows, and this new impetus given to cotton manufacturing industry in the South suggests the possibility of a much more active rivalry in the near future between the interests of these two widely separated sections of the country than at present exists. It is worthy of note that all these new cotton mills that are springing up in the South are equipped with the most modern and improved machinery, which places them in a position to compete successfully with any mills in the country.—New York Manufacturers' Review.

MACHINERY WANTED.

If you desire to purchase machinery of any kind consult our advertising columns, and if you cannot find just what you wish, send us particulars as to the kind of machinery needed. We will make your wants known free of cost, and in this way secure the attention of machinery manufacturers throughout the country. You will thus get all information desired as to prices, etc.

Axe-handle Machinery.—George S. Green, Jackson, Miss., wants to correspond with manufacturers of axe-handle machinery.

Boiler and Engine.—The Southport Lumber Co., Southport, N. C., wants a 50 horse-power boiler and engine.

Boiler and Engine.—Joel E. Brunson, Sumter, S. C., wants an engine with 10 to 12-inch cylinder and boiler to match.

Brick Machinery.—The Buena Vista Improvement Co., Buena Vista, Ga., will probably want brick machinery.

Electric-light Plant.—The Oakland Electric Light & Power Co., Oakland, Md., is in the market for a steam and electric plant.

Engine.—M. G. Richardson & Bro., Keyser, W. Va., will purchase an engine.

Heating Apparatus.—The Sweetwater Woolen Mills, Sweetwater, Tenn., will probably put in heating apparatus.

Hydraulic Machinery.—A Wahoo (Ga.) company will probably purchase hydraulic machinery. S. S. Smith can give information.

Hydraulic Ram.—W. C. McCord, Corn Exchange, Minneapolis, Minn., wants an hydraulic ram to elevate water 30 feet.

Iron Beams, etc.—Jacob S. Allen, Atkinson Building, Wilmington, N. C., wants iron columns, iron beams and galvanized iron cornice.

Iron Roofing.—Joel E. Brunson, Sumter, S. C., wants 20 squares of iron roofing.

Lath and Shingle Machinery.—The Southport Lumber Co., Southport, N. C., wants a lath and shingle mill.

Mattress Supplies, etc.—C. F. Call, High Point, N. C., wants prices and catalogue on supplies and machinery for a mattress factory.

Oil Mill.—Vic. Reinhardt, superintendent water works, Terrell, Texas, wants prices, information, etc., of cotton-seed oil mill.

Piping.—The city of Austell, Ga., will want iron piping for water works. Address W. J. Dobbs, clerk.

Piping.—The Sweetwater Woolen Mills, Sweetwater, Tenn., want price on 2,000 feet of 1-inch pipe.

Planer and Matcher.—Wallace Wainrich, Broadway, Va., wants to buy a second-hand planer and matcher.

Reduction Machinery.—J. W. Seacrest, Blacksburg, S. C., wants information and prices on machinery to reduce garnet for use.

Roofing.—The Austell Chair Co., Austell, Ga., wants roofing for warehouses.

Safe.—The Hagerstown Manufacturing, Mining & Land Improvement Co., Hagerstown, Md., wants to purchase a fire and burglar-proof safe.

Saws.—The Southport Lumber Co., Southport, N. C., wants a circular saw outfit.

Shafting.—Joel E. Brunson, Sumter, S. C., wants 30 feet of 2 7/16 inch shafting.

Soap Machinery.—G. W. Charlotte & Son, Asheboro, N. C., want prices on presses and other machinery for the manufacture of soap.

Spoke Machinery.—G. S. Green, Jackson, Miss., wants to correspond with manufacturers of spoke machinery.

Tanks, etc.—The city of Austell, Ga., will want iron tanks, plugs, etc., for water works. Address W. J. Dobbs, clerk.

Woodworking Machinery.—The Builders' Supply Manufacturing Co., Pensacola, Fla., will soon want woodworking machinery.

Woodworking Machinery.—The Austell Chair Co., Austell, Ga., wants chair and other wood-working machinery.

Woodworking Machinery.—The Tarbell Lumber Co., Southern Pines, N. C., wants a heavy matcher for 2 to 4-inch plank.

Woodworking Machinery.—The Southport Lumber Co., Southport, N. C., wants planer and moulder and rip-saw.

Woodworking Machinery.—M. G. Richardson & Bro., Keyser, W. Va., will purchase a planer, carving machine and mortiser.

Woodworking Machinery.—Waring & Kibble, Piedmont, Ala., will need a lath machine and a heavy flooring mill.

News from Middlesborough.

MIDDLESBOROUGH, KY., Sept. 18, 1890.
Editor Manufacturers' Record:

Final arrangements have been made for the reception and entertainment of the members of the Iron and Steel Institute and their guests from abroad who are to visit Middlesborough about the 20th of October. There will be 600 visitors in all, among whom there will be many ladies.

Alex. A. Arthur, president of the town company, is having prepared an exhibition train, composed of 22 cars and filled with all the natural products to be found on the lands of the American Association. After the visit of the iron and steel men in October, the car will be sent to Louisville, Cincinnati, Atlanta and other cities of prominence, so that the outside world can see what Middlesborough can produce in the shape of coal, iron, coke, bark, minerals, marble, stone and other things.

Col. Geo. E. Waring, Jr., the prominent engineer of Newport, R. I., who is in charge of the drainage and sewerage system in this city, now has over 500 Italians at work widening and straightening the canal which runs through Middlesborough. The cost of this undertaking is \$160,000.

The Belt Railroad is now entirely open for 13 miles, and along its route numerous manufacturing plants are being erected, among which are the South Boston Iron Works, the Middlesborough Zinc Works, the Middlesborough Tannery, the Belt Line Brick Co., the yard and shops of the K. C. G. & L. R. R., the Middlesborough Wood Working Co., the Novelty Wood Works Co., the Trimby & Lynch Planing Co., the Garnkirk Fire Brick Works and the A. G. Pattee Brick Works, which will turn out over 60,000 brick per day. The Belt Line is to be extended 7 miles to the collieries and coke ovens.

Large contracts have already been made for shipment for the 1st of January of coal and coke to Augusta, Macon, Atlanta and Marietta, Ga., Knoxville, Tenn., and Asheville, N. C.

Cardiff Notes.

CARDIFF, ROANE CO., TENN., Sept. 20, 1890.
Editor Manufacturers' Record:

The following is written by F. H. Page, editor of the Boston Daily Advertiser. An introduction is wholly unnecessary: "I never have been more greatly interested in any place than Cardiff. I saw it before it was a railroad station on the map, at its very beginning as it were, and after visiting several of the towns and cities in the South which are most favorably regarded here in the North. Cardiff would impress a stranger to the South favorably, but the impression received would be very favorable indeed to one who has examined more or less closely other new towns in the South. This is not owing to location alone. It is my idea, or at least an idea which I fully accept, that some day not very many years from now the whole region comprised in East Tennessee, Northeastern Georgia and Northeastern Alabama will become noted for the extent and prosperity of its manufacturing interests. There are good locations for many towns there, but that of Cardiff seems to me to be very wisely chosen. There are, however, the elements of management and financial following to be considered, and in these very essential respects, judging from the past, Cardiff is highly favored.

While down there in the spring I took pains to personally examine, so far as one could without scientific knowledge, the coal and iron mines already opened in the veins running through Cardiff. Nature has been marvelously prodigal of her resources, and personal investigation would convince any one, I think, that with wise and strong management, Cardiff is certain to become a large and thriving place, per-

haps one of the very largest in Tennessee—who can tell, in these days of rapid growth and industrial development? The resources are there, the river and railroad are there, the capital is there, and at last accounts the settlers were flocking there in a way to astonish even those who have known something of the growth of the New South. I shall watch with interest the news from Cardiff this fall in the full expectation that there will be no backward step in the town's progress."

It has been Cardiff's lot to be the objective point of the largest excursion that ever entered the South, and now the trip is to be repeated and the announcement made that in point of numbers it will excel the first journey. To those who visited Cardiff last spring, a pleasant surprise is given in the route selected, while those who have never participated in the enjoyment of a journey in this direction will be equally entertained by the ride over the picturesque Baltimore & Ohio and the Queen & Crescent roads.

That the excursion will be a large one is attested to, not only by reports to the management, but the news is carried in many letters to private individuals. While October 4th is quite a distance off in the eyes of some business men, yet many have already planned their engagements so as to spare a week's time following that date. Here in Cardiff the work of preparation for the reception and entertainment of excursionists goes busily on, and it is hoped that the October guests will pass three very pleasant days in this vicinity. Certainly every effort will be made to leave nothing undone in the line of hospitality.

Hagerstown's Boom Solid.

Editor Manufacturers' Record:

Hagerstown is the magic city of Maryland, where money grows more rapidly than in any other city of the State.

The Hagerstown Manufacturing, Mining & Land Improvement Co. controls 1,000 acres of land in and adjoining the city limits, which it is developing rapidly by placing factories upon the same.

The city now contains 95 manufactures, 6 of which have been located through the efforts of this land company in the last 90 days, and will give employment to not less than 435 people.

Hagerstown possesses the most phenomenal advantages of any city in Maryland, outside of Baltimore, with her 6 railroads, her 64 passenger trains and 39 mails daily, her magnificent hotels, her solid streets, electric lights, free postal delivery and healthfulness, make it one of the most desirable places for either manufacturing, business or residence location to be found.

Real estate is cheaper in this city than any other place we know of with only half of her advantages. There are no fictitious values placed upon any of the company's property, nor, in fact, upon any in the city. Manufacturers are finding out rapidly the extreme cheapness with which production can be maintained here, owing to the superior facilities offered of every character, and are weekly making application for sites (which are free to solid concerns), either personally or by letter.

The last establishment located here, on September 20, is a large silk mill from New York city. Attention is called to the full page advertisement contained in this issue.

AN order for 25 of the celebrated canoes, made by H. V. Partelow & Co., 424 to 428 Atlantic avenue, Boston, Mass., and for one steam launch to cost \$1,200, has been placed with that firm by Tampa (Fla.) parties. By personal attention to all details in the construction of pleasure boats, canoes and steam launches, of which Messrs. Porteland & Co. make a specialty, an enviable reputation has been achieved for high-grade work, superior finish and durability.

Developments at Roanoke.

ROANOKE, VA., Sept. 22, 1890.
Editor Manufacturers' Record:

The building operations in Roanoke are at present so extensive as to attract attention both to the immediate state and to the surprising record in house construction for the last year or two. Some facts and figures in both instances may not be amiss. Two new hotels are in process of construction, each to cost about \$100,000—the Ponce de Leon, which is nearing completion, and one on the corner of Commerce street and Salem avenue, for which excavations have just been started, and the Hotel Roanoke is also completing a \$50,000 extension. The Times Building has been finished; a business block of stores for wholesale purposes, to cost \$40,000, is now building, and work on a handsome building for the Citizens' Bank, to cost \$15,000, will soon begin. Other buildings, costing over \$200,000, are either just completed or now going up. The Roanoke Building Co. has been operating for several months, and is now much crowded with work. It is erecting 14 residences at a total cost of nearly \$75,000. Besides these there are going up 28 residences to cost about \$40,000. The Home Investment Co. has also been organized with a capital stock of \$25,000, and has commenced the erection of 30 frame houses near the Midway Iron Works. Over 500 houses were put up in 1888, 1,300 in 1889, and it is believed that the number will go beyond 2,000 in 1890. Over \$2,000,000 has been invested in building in 16 months up to June, 1890.

Since the scheme for the Roanoke & Fincastle Road has been proposed, some mention has been made of a desire for a connection with the Richmond & Danville, to be obtained by a road starting in Charlotte county, about Drake's Branch on the Richmond & Danville, passing through Charlotte Courthouse, thence through the counties of Charlotte, Campbell, Bedford and Roanoke.

The long-discussed question of the Baltimore & Ohio's uncompleted line from Lexington to Roanoke still excites interest, and general sentiment seems to be that if the road does not use the opportunity, the Cumberland Valley extension scheme will shut it out.

An important industry has been started in the shape of the Midway Iron Works, located midway between Roanoke and Vinton. The machinery is expected soon, and the buildings are in a fair way to completion. Capital stock is \$50,000.

The Roanoke Times has recently presented itself to the public in a new and enlarged form, being now an eight-page, six-column journal, printed from new type, on a new Hoe press.

Work for an experimental underground electric railway in this place was commenced about a week ago. The route will only extend a quarter of a mile, but if it proves satisfactory, several miles will be built.

It is proposed to appropriate \$500,000 to improve the streets and sewerage of the city.

Figures in the matter of real estate transfers from the 1st of January up to the middle of September give a surprising showing. The transactions admitted to record mount up to the sum of \$9,286,838. A tabulated statement taken from the Times shows the largest total amount of sales to have been made in June, viz: \$1,352,568. The largest number of sales took place in March. The largest single sale was made in January for the amount of \$65,187.71. 2,600 deeds of trust have been admitted to record during the year. September will probably give a larger showing than any previous month, as 17 days' sales already amount to \$1,240,590. In both real estate and building September will mark an important era for Roanoke.

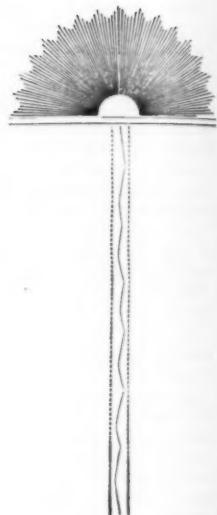
Why Remain in a Dead Town

Or in a section where the future has little of promise, when Tredegar offers to every enterprising man the chance to accumulate a fortune in almost any line of industry?

There are openings here that give assurance of large profits, for the establishment of any enterprise based on iron, manganese, cotton, timber, &c. With an abundance of the highest grade of iron ore, owned by the company, within a mile of the center of the town, with the most extensive manganese deposits ever found in the United States with timber for charcoal at a nominal price there is every reason for iron making being more profitable here than at any other point in the South. Investigation on this point is requested.

A more desirable place for cotton manufacturing cannot be found. The raw cotton can be bought at the door of the mills, and the supply of absolutely pure freestone water is practically unlimited. A cotton-seed oil mill is now being built to utilize the seed that have heretofore been shipped over a hundred miles to a market.

Brick-yards, planing mills, sash and door factories, furniture factories and a wide range of other industries can be established here with the assurance of good profits. House builders and contractors are needed.



TREDEGAR

Unequalled Elsewhere

In the country is the rare combination of minerals found at Tredegar. Iron ore of the highest grade, sufficient in quantity to run many furnaces for generations to come without hauling a ton over five or six miles. Manganese, lead, baryta, building stone of many kinds, including the most beautiful brown stone; clays for building brick, fire brick and silica brick and tiles, lead, &c., are all found here in great abundance.

Tredegar makes no claims that are not based on absolute facts. The most thorough investigation is invited.

For particulars address
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Hercules Ice Machines

FOR
Ice Making, Cold Storage, Packing Houses, Breweries, &c.

Send for our new illustrated circular.

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* HARD WORK *

And good goods are bound to win. We have done lots of the former, and that we produce the latter is evidenced by the wonderful growth of our business. If you use Asphaltum of any grade, it will be to your interest to investigate our claims for

BONNELL'S NUBIAN IRON ENAMELS.

We guarantee absolute satisfaction.

THE NUBIAN IRON ENAMEL CO.
163 Sangamon St., Chicago. Collins Supply Agency, Louisville, Ky., Southern Agts.

THE FRED. W. WOLF COMPANY,

Sole American Manufacturers of

The Linde Ice & Refrigerating Machinery.

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OFFICES:

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Special Designers of Industrial Plants.

Completely Equipped Shops, Foundries, Warehouses, Cotton and Woolen Mills, Grain Elevators, &c.

HENRY RAEDER, Architect; A. S. COFFIN, B. S. CROCKER, Engineers.

**C. R. MAKEPEACE & CO.
ARCHITECTS and MILITARY ENGINEERS**

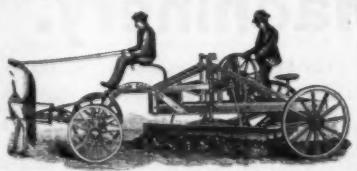
PROVIDENCE, R. I. Plans, Specifications and Estimates furnished for Cotton and Woolen Mills.

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MIXER**
FOR
Wall Plaster and Fertilizers.
MANUFACTURED BY
W. D. DUNNING,
96 W. Water St., Syracuse, N. Y.
SEND FOR CIRCULAR.

**The BOOMER & BOSCHERT
KNUCKLE JOINT
PRESS**
FOR BALING
Cloth, Paper, Yarn, &c.
Or for any other purpose requiring great pressure.
BOOMER & BOSCHERT PRESS CO.
329 W. Water St., Syracuse, N. Y.

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COTTON MILL
Architects and Engineers,
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Money Saved in Street Grading


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The Southern Equipment Co.
CHATTANOOGA, TENN.

**LOCKWOOD, GREENE & CO.
Mill Architects and Engineers,**

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SPECIALTY:

Plans, Specifications and Superintendence for the Construction, Equipment and Organization of Cotton, Woolen, Worsted and other Textile Mills.

**GRAY & FITCH,
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Plans executed for the best modern mill construction. Especial attention given to arrangements of power plants, shafting, etc.

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Water Works, Sewerage, Electrical Works and Municipal Improvements.

Richardson Block, CHATTANOOGA, TENN.

KNOXVILLE, TENN.
Room 10, City Hall. P. O. Box 21.

**WRIGHT & WOOD,
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Sewerage, Drainage, Water Supply, Municipal Work, Surveys, Estimates, Specifications, Superintendence. J. C. WRIGHT, C. E.

C. F. WOOD, J. B. AM. Soc. C. E., Engineer and Superintendent Knoxville Water Co.



**STEAM DREDGERS,
PILE DRIVERS.
VULCAN IRON WORKS, Chicago.**

Send for our 1878 catalogue.

WANTS.

WANTED.—A MAN WITH SMALL CAPITAL to go into the LAUNDRY BUSINESS in some live Southern town. A good opportunity for a live man. Address "PROFIT," care Manufacturers' Record, Baltimore, Md.

YOUNG MAN, speaking Spanish and with business acquaintance in Mexico, would like to represent some manufacturing house in that country or in South America. Best of references. Address "G. F. P." care Manufacturers' Record, Baltimore, Md.

WANTED.—A PARTNER WITH EXPERIENCE AND SOME CASH to invest in manufacture of FURNITURE AND COFFINS at a point in West Virginia where lumber is cheap. I have \$25,000 to invest.

Address

"F. P. S."

care Manufacturers' Record, Baltimore.

B. J. DASHIELL, Jr.

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CONSULTING AND CONTRACTING ENGINEER,
6 South Street, Baltimore, Md.

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A BARGAIN.

Shoe Machinery for Sale

At a bargain. Apply to

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Correspondence solicited. RALEIGH, N. C.

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400 feet Card Platforms, with three long aprons.

400 floor stands, gears, heads, condensing rolls.

Boston Blower and Heater, 2,500 feet pipe, 6 dry.

ing bds. 6 Uhlinger steam hydro-extractor, 2 large dye tubs, 10,000 feet 1 1/2" steam pipe.

60 9-in. Dodge Wood Split Pulleys, various sizes.

50 Dodge Wood Split Pulleys, various sizes.

4 Cone Pulleys.

3 Power Presses.

10 Babcock Fire Extinguishers, hangers, balance

valves, valves, guages, mixers, tubs, iron fire

buckets.

40 Double Flange 5-in. 1-15 Iron Pulleys. In fact,

about three complete outfits suitable for bat-

ting, etc. The whole, or any portion, will be

sold at a price to induce bona fide purchasers

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10 Babcock Fire Extinguishers, hangers, balance

valves, valves, guages, mixers, tubs, iron fire

buckets.

40 Double Flange 5-in. 1-15 Iron Pulleys. In fact,

about three complete outfits suitable for bat-

ting, etc. The whole, or any portion, will be

sold at a price to induce bona fide purchasers

to buy. Can be seen at any time.

25 D. & B. 36-in. Roller Cards. Suitable for yarn or batting. Good condition.

2 Lappers, Kitson & Plitt. Both have scratchers and beaters, double roll eveners. First-class

machines for waste.

3 Latest Van Winkle Openers.

1,000 feet 2 1/2, 1-15, 1-31 Shafting Coupled.

400 feet Card Platforms, with three long aprons.

400 floor stands, gears, heads, condensing rolls.

Boston Blower and Heater, 2,500 feet pipe, 6 dry.

ing bds. 6 Uhlinger steam hydro-extractor, 2 large dye tubs, 10,000 feet 1 1/2" steam pipe.

60 9-in. Dodge Wood Split Pulleys, various sizes.

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1 1/2-in. swing Engine Lathe, 14 ft. bed.
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1 15-in. Crank Shaper.
1 24-in. B. G. Drill Press.
1 Water Grinder.
1 28 in. x 28 in. x 7 ft. Planer.

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1 8-H.P. Portable Engine and Boiler on wheels.
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1 No. 1 Universal Grinding Machine, B. & S.
1 No. 1 Universal Grinding Machine, 40 in. bed, centers. Brown & Sharpe.
1 No. 2 Two-Spindle Profiling Machine. Bement.
1 Set 10-in. x 6-in. Power Bending Rolls.
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1 No. 7 Root Boiler. 1 No. 3 Sturtevant Exhaust.
1 No. 3 Universal Miller. Brauer.
1 No. 2 Lincoln Pattern Miller.
1 No. 1 Paint Miller. Br. & W. Sharpe.
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1 " " " 3 feet " 16 in. wide.
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1 " " " 6 " 18 " chuck.
Co. make, and various other sizes.
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1 Betts 50-in. Horizontal Boring Mill.
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1 Punch, 16-in. throat to punch 1 in. in 3/4 iron.
A No. 1 Order.

Write for Prices.

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Complete estimates made on outfit.

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1 100 h.p. Horiz. Engine, cyl. 16x36 in. Rickards.
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6, 8, 10, 15 & 20 h.p. Portable H. lifting Engs. single & double cyl. & drum. Combined & single.
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1 40 & 50 h.p. Hor. High Speed "Southwark" Aut. Cut-off Engines. 1 H. Eve Hammer.
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50 Upright Tube Steel Boilers, 4 to 40 h.p., cheap.
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1 Worthington Duplex Steam Pump, 1 1/2 in. discharge.
1 Brinton & Henders Steam Pump, 2 in. discharge.

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FOR SALE CHEAP.

Engine Lathes—6 in. x 17 ft.; 42 in. x 12 ft.; 32 in. x 12 ft.; 29 in. x 15 ft.; 24 in. x 10 ft.; 22 in. x 8, 10 and 12 ft.; 20 in. x 8 and 14 ft.; 15 in. x 6 and 8 ft.; 1 each 24 in. x 20 in. and 24 ft.; 24 in. x 12 ft.; 24 in. x 15 and 16 ft.; 18 in. x 10 ft.; 20 in. x 10 ft.; 20 in. x 12 ft.; 1 each 16 in., 6, 8 and 10 ft.; 6 each 14 in. x 6 ft.; 1 14 in. x 5 ft.; 2 each 11 in. x 4 ft. and 5 ft.; 10 in. x 3 1/2 ft. full power.

1 each Planer, 24 in. x 20 in. x 5 and 8 ft.
1 each Planer, 36 in. x 30 in. x 12 ft., with two heads.
1 Planer, 54 in. x 52 in. x 12 ft., 50 in. x 50 in. x 17 ft.
1 Planer, 40 in. x 42 in. x 10 and 12 ft.
1 Planer, 42 in. x 42 in. x 10 and 12 ft.
1 Planer, 22 in. x 30 in. x 4 and 5 ft.
1 Planer, 16 in. x 16 in. x 3 ft.
1 Planer, 42 in. x 42 in. x 12 ft., with two heads.
1 Planer, 50 in. x 50 in. x 17 ft., with one head.
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1 New Horizontal Boring Machine, with facing attachment, Newark Machine Tool Co., makers.
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1 Full System of Print Cloth Machinery.
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20 Second-Hand Narrow Gauge Passenger Coaches.

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Ram's Horn Springs.

The ram's horn springs made by the Hollis Spring Co., Orleans, N. Y., have been upon the market about four years. These springs, which are shown adjusted to a wagon body, are especially made for light surreys, open and top buggies and buckboards. Ten different sizes of this

which the transaction occurred, the day of the month, the month and the year.

It will be observed that the Emerson time stamp takes the place of a number of stamps in general use. It is especially adapted for the use of bankers and brokers, notaries, attorneys, government offices, telegraph, telephone, railway, steamship, express and messenger companies, hotels, restaurants, billiard-rooms, manufacturers etc. Since the introduction of the time

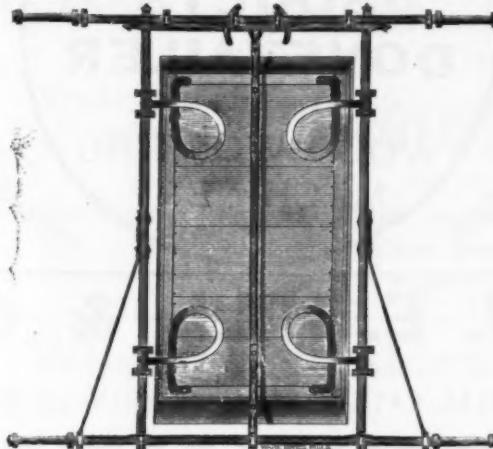


FIG. 1.—RAM'S HORN SPRING.

spring are made. They are fully warranted not to break under any circumstance of use or accident. The attachment of the spring to the side bar is made with a rubber-cushioned socket that prevents all jar from pavements or stony roads. The patent rights for Canada are for sale. Price-list and full particulars regarding this spring will be sent upon application.

stamp several years ago, quite a large number have been sold in the United States and other countries, and many flattering endorsements of their usefulness and the satisfactory character of their work have been received. The stamp is handsomely finished in nickel-plate and enamel, all of its parts are made perfectly interchangeable, and in the event of losses or needed repairs they may be ordered by number.



FIG. 2.—MOORE'S PATENT END GATE.

This same company manufactures Moore's patent end gate, which is also illustrated. The lugs on the nose of the latch swing upward, and in rear of the face of the body iron, and lock it solidly. It can be used either on round or square bodies.

The stamp is guaranteed to be a well-made perfect timing and dating machine, and that it will do its work to the satisfaction of the user.

A pamphlet with illustrations of this stamp and its applications will be sent free by the Automatic Time Stamp Co., 71 Sudbury street, Boston, Mass.

Emerson Time Stamp.

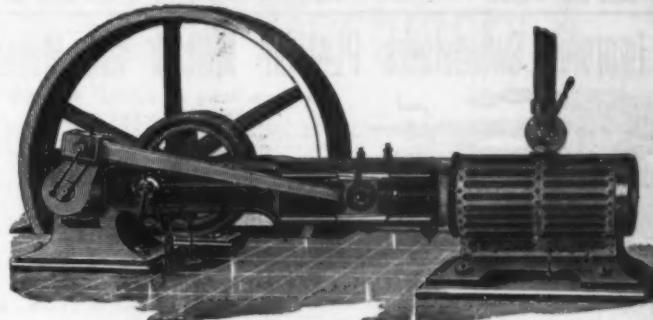
The Emerson time stamp is a simple and ingenious instrument, which with one blow prints a fac-simile of the dial and hands of a clock, showing the exact time at which the stamping was done. The clock is specially designed for this work, and is contained in the base of the stamp with its dial face and hands upward. These parts act as the time-printing die, and necessarily receive the full force of the blows given. They are so arranged, it is claimed, that no matter how hard the blow, the clock itself cannot be injured.

In order to particularly adapt this time stamp to general commercial use, the name and address of the owner is placed in a circle around the clock dial. Behind this is an indexed word-cylinder containing 8 different words, any one of which can be used at will by revolving the cylinder till the desired word is on the top. On the front side of the dial changeable dating wheels for the day, month and year are placed (see advertisement in this issue), the name and address of the owner, the character of the transaction, the hour and minute (A. M. or P. M.) at

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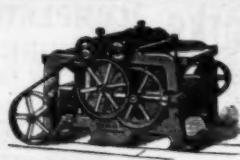
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GENERAL OFFICE 1105 MAIN STREET, RICHMOND, VA.

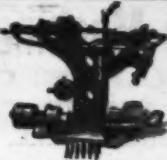
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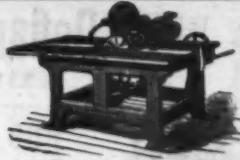
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No. 2-Self-Feed Rip Saw.



No. 3-Molding Machine.



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Every Machine Tested and Warranted.
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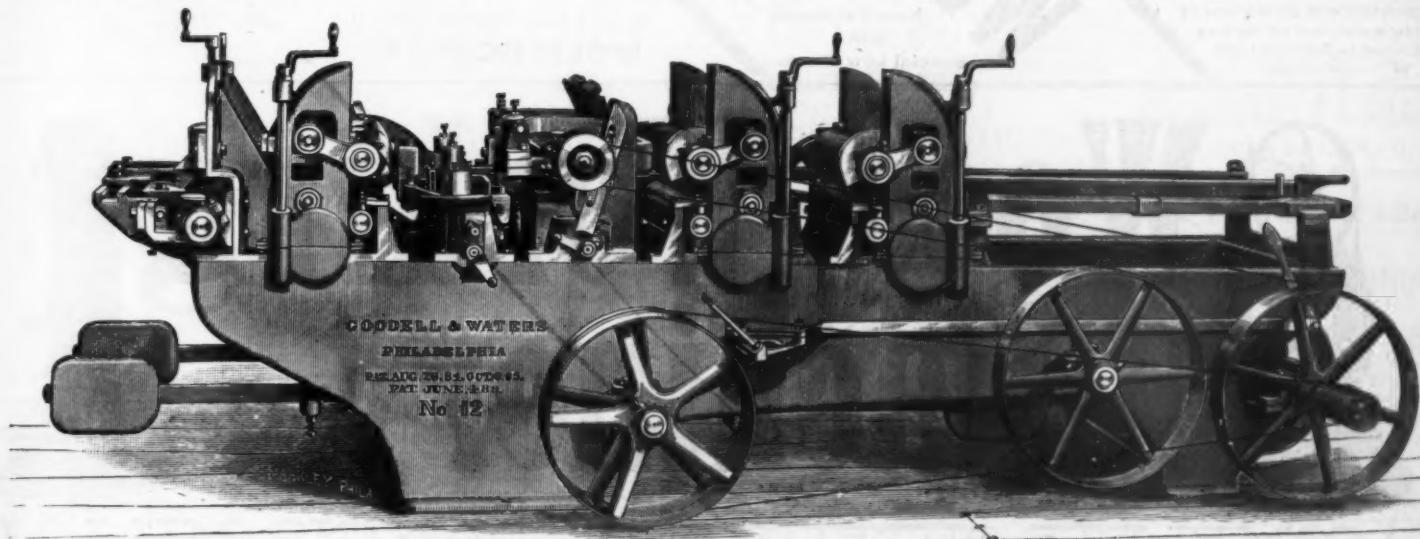
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PERFECT TEMPER. ELEGANT FINISH. SUPERIOR FILING.

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BUILDERS OF
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No. 12 SIX-ROLL PLANER AND MATCHER.

To Double or Single Surface 24 inches wide up to 6 inches thick and match 19 inches wide. Weight 7,000 pounds.

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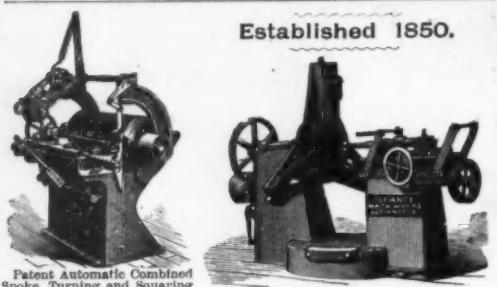
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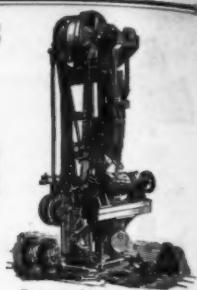
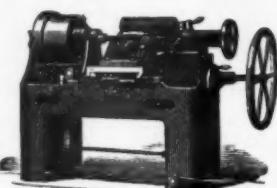
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Patent Plow-Handle Benders, Shapers, Cut-off Saw and Revolving Polishers, Hot-Form, Double and Single Bent Pole and Express Shaft Benders, Neck-Yoke, Singletree, Brush Handle Lathes and Finishing Machines. Estimates and Circulars given upon application.



Patent Automatic Double-Chisel Hub-Mortising Machine. Built in three sizes.

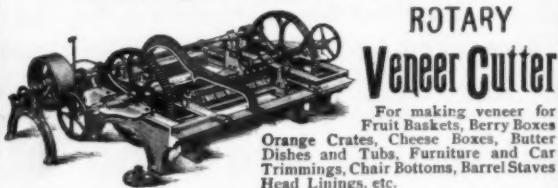
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VENEER CUTTING MACHINES.

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Lockport, New York.

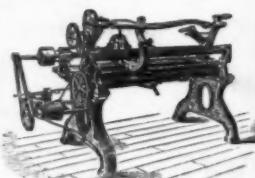


ROTARY
Veneer Cutter

For making veneer for
Fruit Baskets, Berry Boxes
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Dishes and Tubs, Furniture and Car
Trimming, Chair Bottoms, Barrel Staves
Head Linings, etc.

Full Line of Machinery for Veneering and Basket Factories. Choppers, Cranes, Etc.

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OBER IRREGULAR LATHES (protected by patents) for turning axe, hammer and pick handles and spokes. Sand Belt Machines.

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Complete
Outfits
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Time and Labor Saving
Machines to Reduce Cost
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Very Latest
Improved Ma-
chines.

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Yet Attained.

We have a Special Department devoted to
MOLDING BITS.



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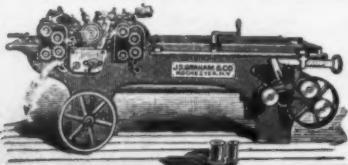
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Machines, Self-Feed Saw Tables, Moulder, Pony Planers, Etc.



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Manufacturers of **Alligator Chisel-Bit Saws,**

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Powerful Portable Light ^{UP TO} 2,000 C. P.

Self Contained. No Outside Motive Used. Complete in Itself, as shown by Accompanying Cut. Simple in Construction. Any Laborer can handle it.

3,000 SOLD LAST SEASON.

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CONSTRUCTION OF

**Fuel and Illuminating Gas Plants,
Petroleum (Crude Oil) Gas Works,
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GAS STREET CAR MOTORS

GAS POWER Maintained at Half the Cost of Horse or Electric.

CHATTANOOGA, TENN.

The CLEVELAND GAS MACHINE CO.

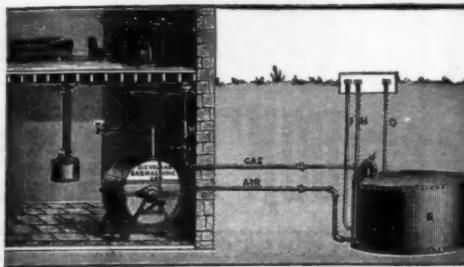
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MANUFACTURERS OF

Improved Gas Machines

For Illuminating and Heating

purposes. Especially adapted for Canning Factories, Mills, Churches and Stores; Country and Suburban Residences requiring from 20 to 1,000 lights; also Gas-Soldering and Metal-Heating Outfits and Special Machines for Meat-Packaging Establishments. Correspondence solicited. Send for illustrated circular.



STICKNEY OIL BURNER
For Heating Soldering Coppers.

Saves insurance premiums, decreases fire risks. Economical and reliable. Always ready for use. Write for circular D and special information.

STICKNEY OIL BURNER CO., Portland, Me.

TORCHES

To burn Gasoline and Oil. 500,000 in use. Not affected by wind or weather.

Gasoline Furnaces

For plumbers' use. Powerful Flame. Removable Melting Pot. Wind does not affect it.

GASOLINE PAINT BURNERS.

Steel Bodies. Light and Strong. Adjustable Burner.

ALL GOODS GUARANTEED.

SOLE MAKERS

The Schneider & Trenkamp Co.
CLEVELAND, O.



RELIABLE

Torches.

Furnaces.

Paint Burners.

SAVE GAS. REDUCE BILLS AND SECURE BETTER LIGHT.

The American Gas Saving Co's Gas Controller.

Over 200,000 in use. Saves from 15 to 50 per cent. according to pressure in mains.

Adopted by U. S. Government after competitive tests; New York Elevated Railroad (saving \$11,519.37 in five months, over \$100,000.00 in five years). In use in thousands of Mills, Factories, Hotels, Depots, Public Buildings and Private Houses. Send for descriptive circular and testimonials. Find size of meter or brass plate in front with maker's name.

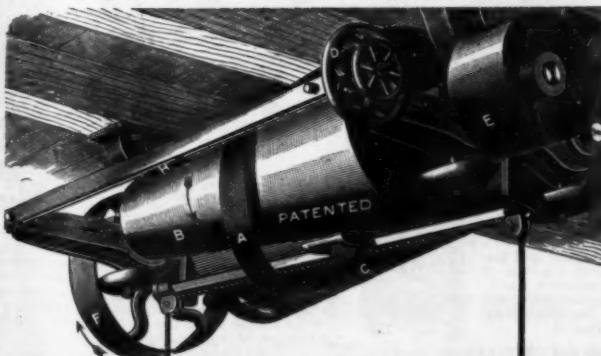
Full directions for attachment and testing sent with each. Controllers sent for trial on receipt of price, and money refunded, less express charges, if unsatisfactory and controllers returned in good order. All orders C. O. D. Agents wanted.

AMERICAN GAS SAVING CO., - - - - - 35 Broadway, N. Y.

THE EVANS SYSTEM OF FRICTION

(PATENTED.)

FOR TRANSMITTING POWER WITH EITHER STEADY OR VARIABLE SPEED.



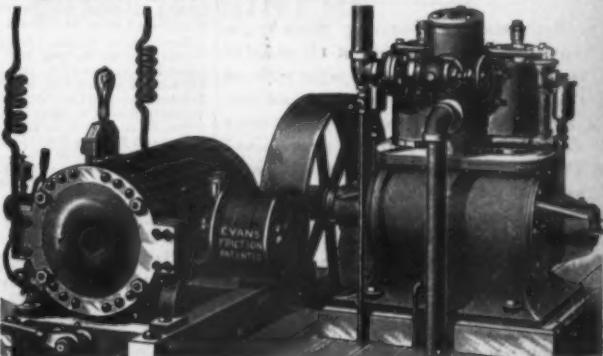
WE GUARANTEE

GREATER

EFFICIENCY

THAN WITH

ORDINARY BELTS.



By the use of our Friction Cones the speed of any machine may be varied automatically or by hand while the machine is running, and the machine can be started and stopped without the use of loose pulleys.

The above cut represents a dynamo being driven from a Westinghouse engine by our system. Advantages: Room Saved! Power Saved! Belting Saved! Each dynamo may be started or stopped without the use of clutch pulley, and without slowing the engine, by simply turning a hand wheel.

We refer you to Plants which we have in Successful Operation.

EVANS FRICTION CONE CO., 85 Water Street, BOSTON,

Send for Catalogue.

TRADE NOTES.

ONE pair of Corliss condensing engines, 30x72, complete in all details and in good order, can be bought at a low figure from Albert Metcalf, 26 Franklin street, Boston, Mass.

LEWIS COLLINS, late of the Collins Varnish Co., has taken the Southern agency for the Nubian Iron Enamel Co., of Chicago. The large acquaintance of Mr. Collins with the Southern trade will make him invaluable in extending the sale of Bonnell's Nubian iron enamels in this territory.

MR. EDWARD D. BOLTON, of the firm of T. William Harris & Co., 44 and 46 Broadway, New York city, engineers and contractors, has charge of the following works as chief engineer: Sewerage systems at White Plains, N. Y. and Tarrytown, N. Y. Mr. Bolton has also been engaged to prepare plans for the water works, recently reported in our construction department, to be constructed at Morristown, Tenn.

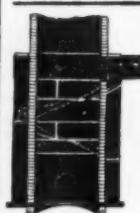
THE attention of architects and builders generally is called to a new feature in metallic construction, that is, the corrugating of as heavy sheets as number sheets xx 12, and up to 10 feet in length, for which there has been such great demand, especially for arches. The Cincinnati Corrugating Co., of Piqua, Ohio, are enabled to do this by means of their heavy, special machinery, and can fill all orders promptly.

IN a letter from N. Mackey, president Mackey Brick & Tile Manufacturing Co., San Antonio, Texas, to George Isaacs, president Eureka Brick Machine Manufacturing Co., St. Louis, Mo., he says of the two Eureka presses put in by the latter company: "They fill all the representations made by you to my entire satisfaction. We make every day from 45,000 to 50,000 brick every ten hours' run. Our machines run like clockwork, and we will be most happy at any time to show them and their work to any one who wishes a brick machine to make the dry process." These works are located 20 miles from San Antonio at Calavaras on the Aransas Pass Railroad.

WE are informed by The S. Obermayer Foundry Supply Mfg. Co., of Cincinnati, Ohio, that aluminum ferro-silicon alloy, which is intended to improve castings, is endorsed by many well known firms. Strong claims are made for this material, some of which are, it insures softer, denser and closer work, scrap and cheaper pig can be safely used with it, while it is applicable either in the cupola or ladle. It is put up in packages of about 300 pounds weight. This company have applied for a patent on a compound which is called Brassoline. In its preparation the known needs of manufacturers of brass goods were carefully considered and so much confidence is felt by the producers of Brassoline that it is guaranteed to clarify molten brass of steel, iron and other impurities.

VALUABLE manufacturing property in Anniston, Ala., consisting of 1/4 acres of land well located, on which is the plant of the Murray & Stevenson foundry and machine shops, completely equipped in every department with improved appliances and a full line of patterns will be sold, by an order of the City Court of Anniston, at public auction, on Wednesday, October 1, 1890. This sale is to be made to close up the partnership business of the late firm of Murray & Stevenson, both partners being dead. Mr. S. D. G. Brothers is the administrator. The resources of the Anniston iron district and the rapid growth of the city of Anniston, with its natural advantages as a manufacturing center and as a place of residence, are known to the

readers of the MANUFACTURERS' RECORD, so that no doubt will be entertained by them of the future success of this plant, if it be acquired and operated by practical, experienced men.



VICTOR COLLIAU,
Sole Manufacturer
OF THE
Improved Patent HOT BLAST
Colliau Cupola.
Address 287 Jefferson Ave.
DETROIT, MICH.



The COLLIAU
PATENT
Cupola Furnace.
Adapted to all Foundries,
The Most Economical,
The Lowest in Price.
MANUFACTURED EXCLUSIVELY BY
BYRAM & CO.
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JAS. P. WITHEROW.
ENGINEER & CONTRACTOR,
Furnace & Steel
Plant Construction.
PITTSBURGH, U. S. A.

Blast Furnaces and Steel Works designed and erected complete in every detail ready for operation. Special attention given to the manufacture of

* HEINE *
Safety Water Tube Boilers.

Owning an extensive manufacturing plant, I can guarantee promptness in execution, and satisfaction in any contracts undertaken by me.

Gordon, Strobel & Laureau,
(LIMITED),
ENGINEERS AND CONSTRUCTORS,
PHILADELPHIA, PA.
BLAST FURNACES,
STEEL PLANTS,
FIRE-BRICK STOVES,
BLOWING ENGINES.

We are sole manufacturers of the Gordon-Whitwell-Cowper Fire-Brick Hot-Blast Stove, and within four years have introduced them as follows:

| | |
|----------------------------------------------------------|-----|
| Jefferson Iron Works, Ohio..... | 4 |
| North Chicago Rolling Mill Co., Ill..... | 3 |
| Joliet Iron & Steel Co., Ill..... | 4 |
| Missouri Furnace Co., Mo..... | 3 |
| Jupiter Furnace Co., Mo..... | 3 |
| Western Steel Co., Mo..... | 3 |
| Tenn. Coal, Iron & R. R. Co., Ala. and Tenn..... | 21 |
| Cleveland Rolling Mill Co., Ohio..... | 4 |
| Belmont Nail Co., W. Va..... | 8 |
| Sloss Iron & Steel Co., Ala..... | 9 |
| Sheffield & Birmingham Coal, Iron & R. R. Co., Md..... | 6 |
| Southern Iron Co., Tenn..... | 2 |
| Decatur Land, Iron & Furnace Co., Ala..... | 2 |
| N. Y. & Perry Coal & Iron Co., Ohio..... | 2 |
| Princess Furnace, Va..... | 4 |
| Irondequoit Furnace, W. Va..... | 2 |
| Cornwall Anthracite Furnaces, Pa..... | 4 |
| Duluth Iron & Steel Co., Minn..... | 3 |
| Geo. P. Whittaker Co., Md..... | 2 |
| Phila. & Reading Coal & Iron Co., Elizabethtown, Pa..... | 3 |
| Burden Iron Co., Troy, N. Y..... | 3 |
| Junction Iron Co., Ohio..... | 4 |
| Lawrence Furnace Co., Ohio..... | 2 |
| Piedmont Land & Improvement Co., Ala..... | 2 |
| Eckert & Brother, Reading, Pa..... | 2 |
| Leesport Iron Co., Leesport, Pa..... | 2 |
| Total..... | 107 |

THE IMPROVED LANCASTER
Turbine Wheel.

Write for Descriptive Catalogue.



Lancaster Turbine Wheel Co., Lancaster, Pa.

Rome Foundry & Machine Works,
ROME, GA.

Manufacturers of the well known

DAVIS DOUBLE TURBINE

Water Wheel



Beyond all question one of the best Wheels on the market, and is fully guaranteed.

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Portable & Stationary Engines
AND BOILERS.

Grist and Flouring Mill Machinery.

The Balanced Gate Turbine.

PAT. SEPT. 3, 1889.

High Percentage,

Great Simplicity,

GLOSE FITTING

AND

EASY WORKING GATE

Under all Circumstances.

Sold under Full Guarantee at Low Prices.

Send for Descriptive Pamphlet.

CHRISTIANA MACHINE CO., Christiana, Pa.

Makers of all kinds of Machinery for Transmitting Power. Perfect Goods Only.



THE "AUBURN" Watchman's Clock.

The best in the market, and the only one combining a system of fire and superintendent's alarm. The most complete safeguard ever invented. No factory can afford to be without it.

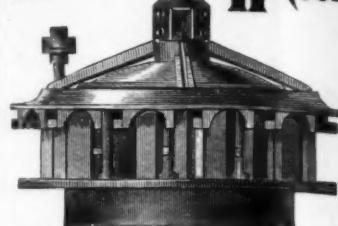
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Water Wheel.



This Wheel is strong and durable. Exceeded all other wheels in the great trial tests. Is in use all over the nation. I also make a specialty of

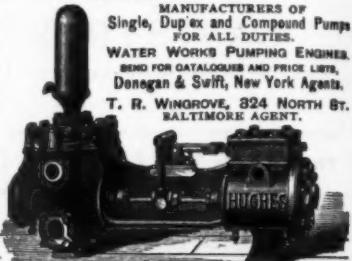
HEAVY GEARING & MACHINERY

For Paper, Cotton and Grist Mills.
S. MORGAN SMITH, York, Pa.

ALCOTT
IMPROVED TURBINE
WATER WHEELS.
MOUNT HOLLY, N. J.

HUGHES STEAM PUMP CO.
CLEVELAND, O.

MANUFACTURERS OF
Single, Duplex and Compound Pumps
FOR ALL DUTIES.
WATER WORKS PUMPING ENGINES.
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T. R. WINGROVE, 324 NORTH ST.
BALTIMORE AGENT.



**DON'T BUY AN
ENGINE OR
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Until you have seen our circulars. Engines complete from 5 to 110 horse power, both Vertical and Horizontal, at prices below those of other reputable makers. 1600 in use. Boilers of every style. Automatic Engines for Electric Lights. Centrifugal Pumping Machinery for Drainage or Irrigation. Established 22 years. Perfect satisfaction guaranteed. Ask for Circular M and address

Morris Machine Works,
BALDWINSVILLE, N. Y.

THE SIMMERLY
DERRICK.



This is a revolving Derrick which makes a perfect circuit from either right or left. It can be worked from a lighter or Steamer same as on solid ground. It is adapted for the hoisting of stone, iron ore, coal or any material, and can be used with or without the bucket. Capacity is one lift raises from one to five tons. Further particulars on application to

Simmerly Derrick Co.

101 Center Street, Cleveland, Ohio.

EDMONDS & ROBINSON,

In the development of its agricultural, mineral and timber resources; in its general building and advancement, Texas is making more rapid progress than any other State in the Union. Its population is increasing at a stupendous rate. Millions of dollars from the West and Northwest, from the New England States and from England are pouring into the State for investment in factories, mills, railroads and commercial enterprises.

San Antonio is the commercial and financial center of the great South and Southwest Texas. It is a city of 55,000 population, is the center of the most important railroads in the State, has four national and five private banks, building and loan associations, a large number of industrial establishments and some of the largest jobbing houses in the Southwestern States.

LAWYERS

AND DEALERS IN

REAL ESTATE

In the matter of homes it is the handsomest city in America.

In twelve years it has grown from 20,000 to 55,000.

It is growing more rapidly now than at any former period.

Property in and around San Antonio and throughout Southwest Texas is increasing in value every day. It will never again be as cheap as it is now.

There is no place in the world offering greater inducements for the purchase of real estate, either for investment or speculation, with assurance of such large and certain profits.

SAN ANTONIO, TEXAS.

REAL ESTATE

FOR

Investment or Speculation.

One of the Most Solid and Substantial of all the Southern Towns is

BRISTOL, TENN.

It is in the center of the richest mineral, timber and agricultural sections of the South—East Tennessee and Southwest Virginia.

It is becoming an important railroad center.

It has now a population of 10,000, which is increasing every day.

It has in the HOTEL FAIRMOUNT one of the handsomest and most thoroughly equipped hotels in the South.

It has in operation car shops, planing mills, foundries, woolen factory, cotton factory, carriage factory, veneer factory, canning factory, planing mills, brick-yards, &c. An iron furnace to cost \$300,000 has been contracted for.

The climate of Bristol makes it a natural sanitarium the year round.

There is no better place in the South for profitable real estate operations.

Some of the best business, residence and suburban property in the town is controlled by

W. A. R. ROBERTSON,
Real Estate Agent.

Write to him for details. He is giving particular attention now to two or three special things that will pay big profits on short turn.

Auction Sale of Valuable Building Lots

NEWPORT NEWS, VA.

WEDNESDAY, OCTOBER 15th, 1890.

— BY —
THE NEWPORT NEWS LAND & DEVELOPMENT CO.

THIS IS WHAT YOU HAVE BEEN LOOKING FOR.

AN INVESTMENT WITH SURE PROFITS BEHIND IT.

Newport News is so well known that but little comment is necessary. It is the eastern terminus of the great CHESAPEAKE & OHIO RAILWAY SYSTEM, and the best deep-water port on the Atlantic coast. It has the largest DRY DOCK and the largest and best equipped SHIP-BUILDING PLANT in America, besides NUMEROUS OTHER INDUSTRIES already established. A COTTON MILL COMPANY, LIGHT & WATER COMPANY and a STREET RAILWAY COMPANY are organized.

TEN MILLIONS OF DOLLARS HAVE BEEN INVESTED.

Next Year 6,000 men will be employed, and more than \$3,000,000 PAID OUT FOR WAGES in this city. Our population must soon be 20,000 people.

NEWPORT NEWS SUCCEEDS BECAUSE IT IS A SUCCESS.

These lots are located on the line of the projected street railway, within the present city limits. TERMS OF SALE—Ten per cent. Cash, balance in easy instalments. Sale will be continued if deemed advisable.

IRON COTTON. LEATHER.

Goods made at the point both of production of the raw material and consumption of the manufactured article, with cost of making comparatively low, must return best profits.

Bluffton, at the "IRON BLUFFS," Northern Alabama,

surrounded by furnaces making the best of foundry and car wheel iron; in a county producing 10,000 bales of cotton; with large tanneries nearby, and with the great unoccupied market of the South and Southwest at its door, offers the above advantages to investors in manufacturing industries, and will give liberal subsidies of land to support the stock of companies located there.

LIBERAL AID TO SMALL INDUSTRIES.

Address BLUFFTON LAND, ORE & FURNACE CO., Bluffton, Ala.

Excursion train leaves Boston at 2 P. M., Friday October 10th; Baltimore, about 5:30 A. M. October 11th for a week's tour of the "New South," via the Shenandoah Valley, visiting Caverns of Luray and Natural Bridge and the leading cities and "boom towns" of the "New South."

One whole day at the great mines of the "IRON BLUFFS" at Bluffton, Ala.

Particulars from C. P. GAITHER, Agent East Tennessee, Virginia & Georgia Railroad, 290 Washington Street, Boston, or JOHN C. FIELD, 1205 Myrtle Avenue, Baltimore.

One Week in the "NEW SOUTH."

JOHN C. FIELD,

REAL ESTATE,

TREDEGAR, ALA.

Information cheerfully given relative to the proposed improvements to be made in Tredegar, Ala., a town with accomplished realities and not possibilities only. I can offer some property during the summer months at a minimum figure, when considering the certain enhancement of values that is sure to follow. A Steel Plant, giving employment to 3,000 hands, is assured. This plant alone, when taken with the present established population of 2,500, represents a city in excess of 10,000 souls. Other industries of equal importance are guaranteed in additional. Address

JOHN C. FIELD, Tredegar, P. O. Jacksonville, Calhoun Co., Alabama.

B. R. HUTCHKRAFT, Pres.

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THE SOUTHLAND INVESTMENT CO.

REAL ESTATE, STOCK & BOND BROKERS

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P. O. Drawer 6.

KNOXVILLE, TENN.

OUR BUSINESS.

We Buy and Sell on Commission Real Estate, Stocks and Bonds. Organize Companies to handle Mineral and Timber Lands.

Report upon Costs of Mine Equipments, including Tramways and Railways. Maps and Profiles Furnished. Reports upon Value of Lands and Abstracts of Titles Furnished.

Act as Agents for Local and Non-resident Property-holders to Collect Rents and Sell Property.

Come and see us; if we do not have what you want we will get it for you.

List your property with us.

To Secure SOUTHERN TRADE

ADVERTISE IN THE

MANUFACTURERS' RECORD.

DENISON,

TEXAS.

THE
Future Manufacturing and Commercial Center
OF THE
GREAT SOUTHWEST.

DENISON SUPPLIES THE COAL FOR TEXAS.

She has at her gates the only **COKING COAL** of any value in the Mississippi Valley. To the Southwest lies the best **MAGNETIC IRON ORE** in the world, while to the north and Southeast are fields of **BROWN HEMATITE ORE** of the finest grade. These ores must meet the **COKE** and **COAL** at DENISON and there to be worked.

DENISON cannot be surpassed for **HEALTHFULNESS** and **BEAUTY** of location. Six divisions of railways terminate at Denison and are operated by her citizens.

DENISON has an abundant supply of pure, soft water and plenty of good, cheap **BUILDING MATERIAL**.

The attention of investors and those seeking advantageous locations for business or for manufacturing plants is invited to the opportunities presented at Denison.

MUNSON & BRO. HAVE SUPERIOR FACILITIES FOR THE SAFE AND PROFITABLE INVESTMENT AND HANDLING OF CAPITAL.

For information about DENISON and for bargains in BUSINESS and RESIDENCE PROPERTY, ACRE PROPERTY and FARMS NEAR THE CITY, write or call upon

MUNSON & BRO.

301 WOODWARD STREET,

DENISON, TEXAS.

Six Trunk Line Railroads at BESSEMER

In the heart of Mineral Alabama, encircled with hills of Coal, Iron and Limestone Rock.

"The South is the coming El Dorado of American adventure. May the Almighty speed and guide her onward progress!" So wrote the Hon. W. D. Kelley, M. C., of Pennsylvania, a few months ago, and every day brings forth new evidence to prove the correctness of his prediction and to show that without a doubt the South is to be the richest country upon the globe. In climate, soil, mineral and timber wealth, in rivers large and small, in a long seacoast, in abundant rainfall, in healthfulness and in every other advantage that could be asked nature seems to have done her best for this favored land. The wealth in iron and coal is beyond estimate. Of timber there is an unlimited supply, including nearly every variety of hardwoods for woodworking purposes.

Seven Furnaces, output 1890, 250,000 tons; Rolling Mill, 100 tons daily; Fire Brick Works, 25,000 daily; Many Lesser Industries

WHERE
MONEY
WILL
GROW!

Offers Thirty Varieties of Hardwoods for Woodworking Industries.

11,000 City Lots For Sale.

The Bessemer Land & Improvement Co.

this new year, are prepared to deal liberally for the founding of Iron and Woodworking industries in this growing Mining and Manufacturing Center.

H. F. DeBARDELEBEN, Pres.
H. M. McNUTT, Secretary.

BIG STONE GAP

COAL.

Two beds of coking coal, each one over six feet thick, making as good coke as is produced in the United States, will be mined and coked within three miles of the town. Two beds of gas and steam coal, each over four feet thick, and a bed of cannel coal underlies the same territory.

IRON.

Two reliable beds of red fossil iron, one carrying 48 per cent. iron, and a large deposit of Oriskany ore, carrying 52 per cent. iron, underlie in part the town site, and thousands of acres on lines of S. A. & O. R. R. and L. & N. R. R.

TIMBER.

The most valuable area of virgin forests, of walnut, hickory, oak, ash, yellow poplar, (white wood,) birch, hemlock and chestnut oak, in the United States, immediately tributary to the town.

WATER.

Supplied by two rapid rivers flowing around the town. Water works, piping from an elevation 350 feet above the town site, now under construction.

RAILROADS.

Concentration of railroads at this point inevitable. South Atlantic & Ohio now completed from Bristol, Tenn. Louisville & Nashville graded and nearly completed. Several other roads now under construction.

CHEAP FUEL. CHEAP RAW MATERIAL. CHEAP TRANSPORTATION.

An \$800,000 iron plant under construction.
Five hundred coke ovens to be built at once.
Electric light, street railway, good hotels, etc., etc.

MORE ADVANTAGES COMBINED THAN CAN BE FOUND IN ANY OTHER LOCALITY.

Manufacturers Wanted. Substantial Inducements held out.

On and after September 15th lots will be sold at schedule rates. Reductions to builders. Address

Big Stone Gap Improvement Co., or Real Estate Exchange,

BIG STONE GAP, VA.

The Stanley Furnace & Land Co.

OF

STANLEY, Virginia.

FORMERLY SANDS, VA.

The Manganese City.

CAPITAL STOCK \$1,000,000.

SHARES \$100.

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Maps, designating villa, residential sites, lots for business purposes and locations for manufacturing enterprises will be ready for distribution in a few days.

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Great Sale of Lots, October 21, 22 & 23, 1890.

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THE INTER-STATE METROPOLIS.

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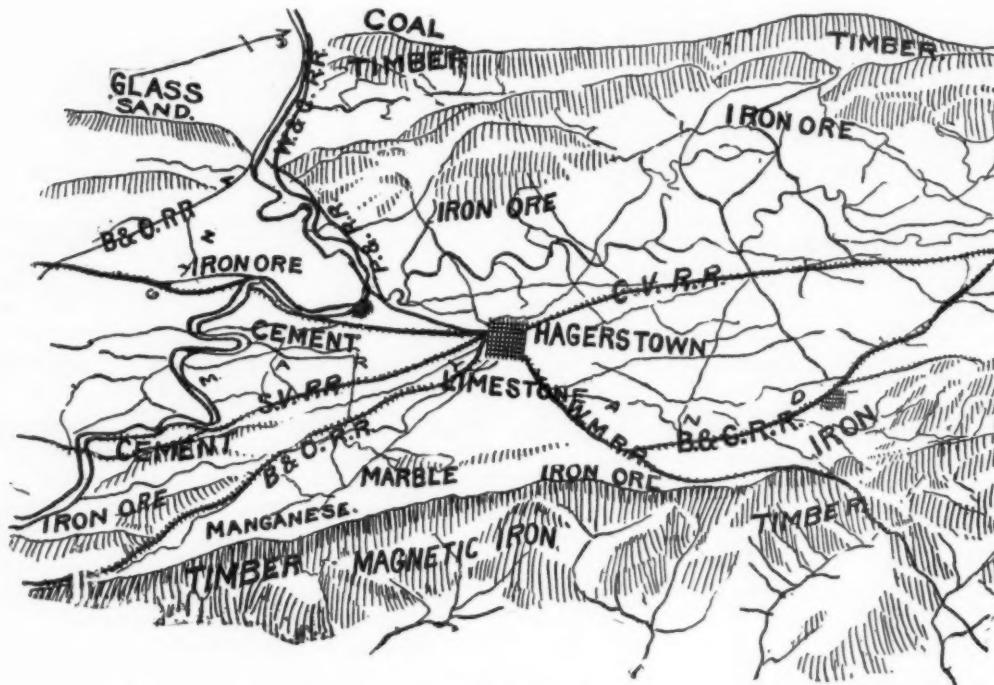
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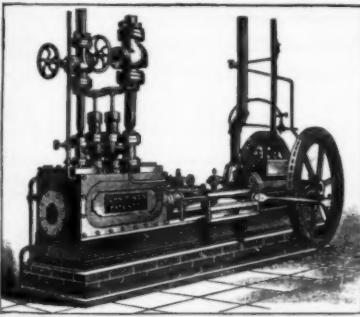
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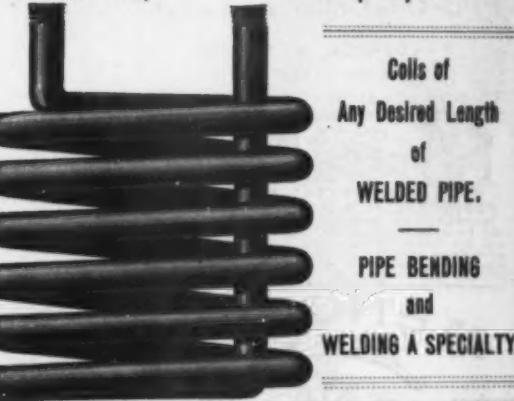
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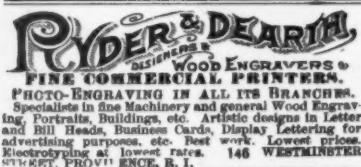
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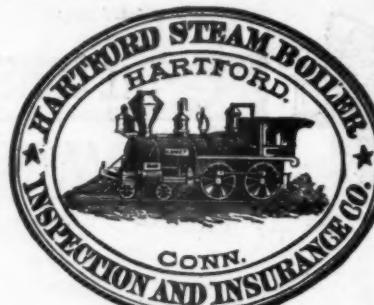
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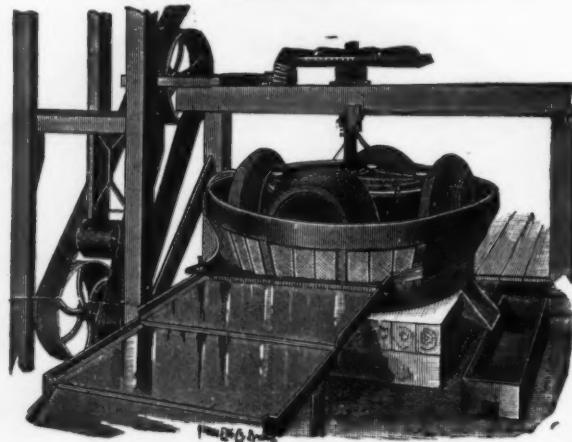
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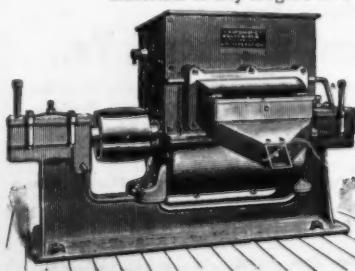
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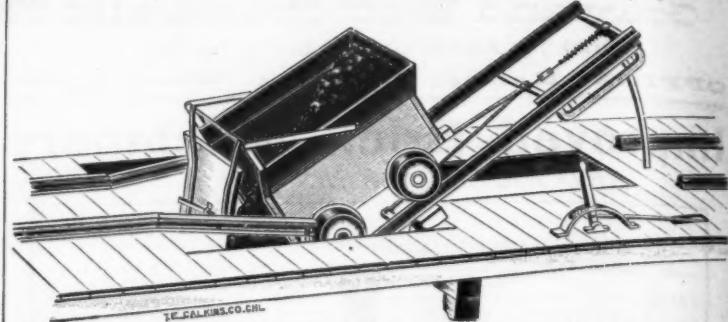
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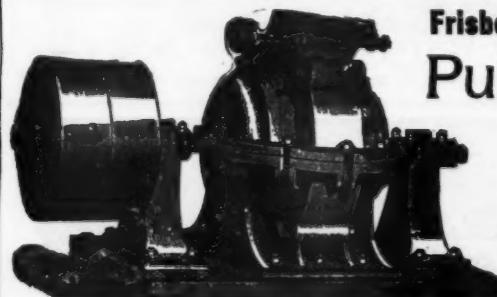
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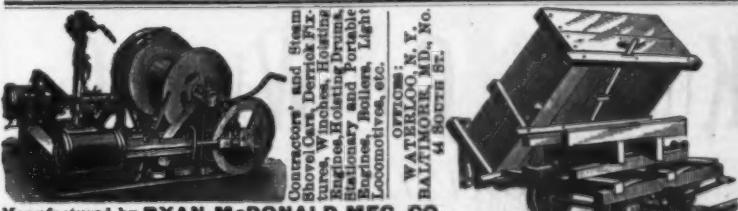
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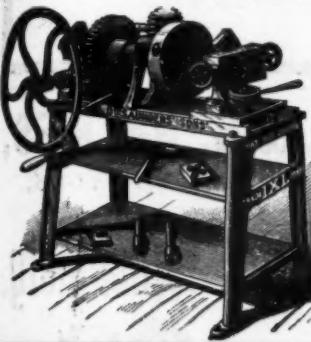
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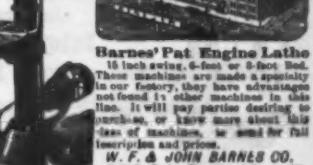
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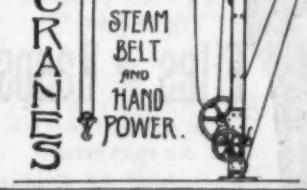
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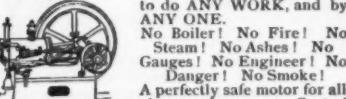
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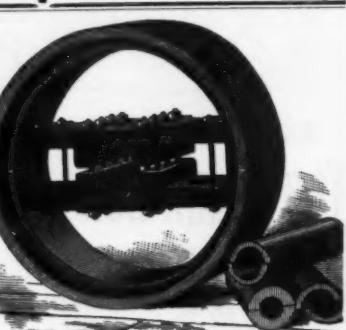
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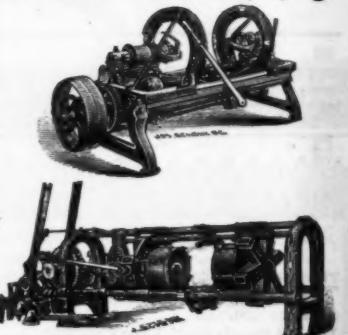
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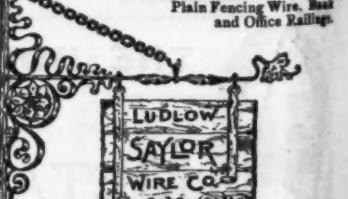
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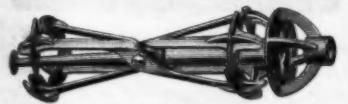
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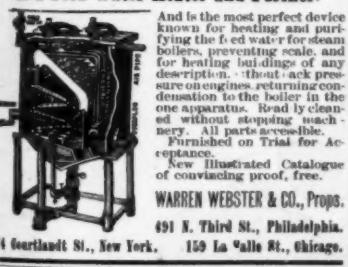


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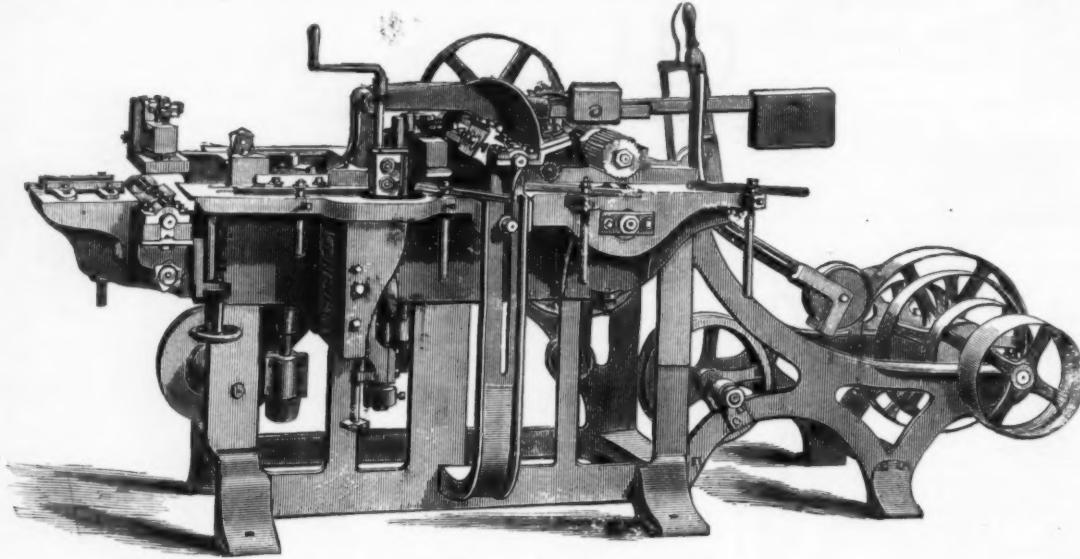
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Improved Seven-Inch Four-Sided Moulder.

The engraving herewith represents the seven-inch four-sided moulder manufactured by the Indiana Machine Co., of Fort Wayne, Ind. Many improvements in this machine, which are valuable, and which will be appreciated by those who use them,



IMPROVED SEVEN-INCH FOUR-SIDED MOULDER.

have been recently made. It is constructed upon the same principle as their other moulders, the gibbs which hold the table to the frame being where they should be, in order to make all the heads do perfect work. The large one is directly under the top-head, and the other directly under the under-head, and the side-heads are between the two. This arrangement holds the table very rigid, and there is not the least vibration of any part of it.

It is capable of working mouldings or any other irregular or smooth work up to seven inches wide and three inches thick; and the table will lower 14 inches, so that lumber of that width can be worked on the edges. The upper portion of the outside bearing for the top-head can be removed, which will permit wide boards to be run through. This bearing is rigid and of new design. It consists of two pieces, clamped together by the screw shown in the middle of it, and, if the inside bearing should wear more than the others (as it usually does), the outside bearing will always find its level with it, and will not spring the shaft, but holds it in its correct position.

The under cutter-head has an adjustable plate in the front of it for chip breaking. This can be moved away from the head, so that moulding can be sprung with it. The inside-head also has a chip-breaker in front of it, which can be adjusted, and an adjustable guide back of it.

The ratchet binder, for feed-belt, is of new design and works very satisfactorily.

A new feature in this machine is the power applied to the very large roll in the table, or the under-feed. The upper rolls are much larger than is usually placed in machines of this size, and all the gears which drive them are strong and heavy, and will wear as long as the machine. The gears are so arranged that a very little power will feed the heaviest work through without any trouble.

Another new feature is, the inside headstock is adjustable up and down, and can also be set on an angle and moved in or out or up and down without changing the angle, in the same manner as the outside headstock is adjusted. The under-head is also placed in a separate headstock, which can be moved sideways, with a hand-screw, or up and down. By moving it in this way, the shaft always keeps the same bearing in the boxes, and, it is said, works better,

and it is preferable to moving the shaft through the boxes.

Another very valuable improvement is the patent pressure-shoes, which can be thrown back, entirely out of the way, when the operator desires to work at either of the heads; and when they are pulled back on the work and the pin is inserted, they are in exactly the same place on the work

Coal and Ore Handling Machinery.

The Moore Manufacturing & Foundry Co., of Milwaukee, Wis., make a specialty of entire outfits of coal and ore handling machinery, including engines, drums, carriages, buckets, blocks and tracks.

The Moore double cylinder paper fric-

tion pins are of the best machine steel. The valve is what is known as the rocker valve. The steam and exhaust ports are large, insuring quick and positive operation.

The friction drum has cast-iron heads with heavy flanges, to which is riveted a shell of $\frac{1}{4}$ inch boiler iron. One end of the drum is provided with a flange 4 inches wide for the brake. The brake strap is lined with dry maple blocks, and is operated by a powerful lever, which holds the load under the complete control of the operator. The other drum head is dished to receive the paper friction, and has an area of 350 square inches in frictional contact. The paper is held on the wheel by lugs to avoid lateral displacement, and firmly clamped by bolts between the web of the wheel and a heavy wrought-iron ring.

Correspondence is solicited by the manufacturers, who are prepared to furnish drawings and estimates at short notice.

Hand-Cut Files and Rasps.

In the accompanying cut is shown the teeth of a hand-cut file, made by Reynolds Bros., Columbus, Ohio, and those of a machine-cut file. The difference of the teeth is readily seen by file users. This is said to insure quicker, better and less laborious work. Perhaps no concern in the country has acquired a wider reputation for the manufacture of hand-cut files and rasps than has Reynolds Bros. They have endeavored to surround themselves with the



most skilled and experienced labor, and conduct their business on a very large scale, employing upward of 40 men. They use only the best of steel, and have reduced the process of manufacture to a science. Consequently their files and rasps are now in use in some of the largest manufacturing establishments, railway and machine shops. Their goods are sold under a guarantee which affords ample protection to their patrons.

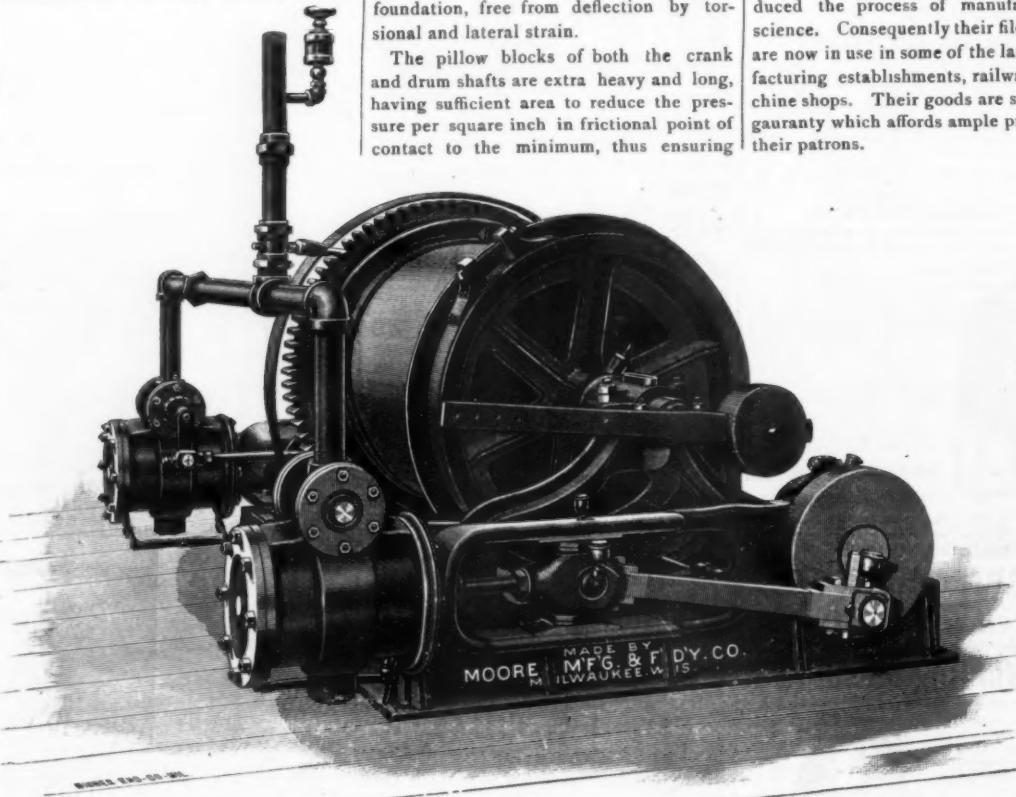
again. They save a large amount of time, as they can be set down on an angle and accommodate themselves to any uneven work, holding it firmly the whole width.

An improved spring post is also appended, which saves time and expense. In fact, these recent improvements make this a complete and desirable machine. It is constructed in a superior manner, having steel shafts, four slotted steel heads that have bolts made of Norway iron, and case hardened nuts. Every machine tested

tion hoisting engine shown in accompanying cut is gaining a world-wide reputation, and becoming very popular with coal and ore handlers in every part of this country, including the new coal and iron regions of the South. The following is a brief description:

The main frame is cast in one piece in the form of an inverted T, with intermediate braces or stiffeners placed alternately on the inside and outside of the web, thereby insuring a stiff and substantial foundation, free from deflection by torsional and lateral strain.

The pillow blocks of both the crank and drum shafts are extra heavy and long, having sufficient area to reduce the pressure per square inch in frictional point of contact to the minimum, thus ensuring



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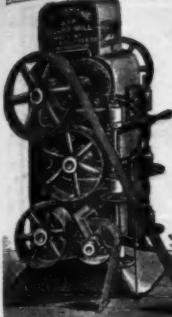
The company also builds a six-inch machine, same as above, with the exception that the outside bearing is same style as is used on the five-inch machine.

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long wear and continued service. The engine frame is what is known as the straight-line frame, one end of which is used as a cylinder head, the cylinder end and bearings for the cross-head being bored at the same time. The cylinder frame is fastened to the main frame with turned bolts closely fitted. The valve stem, piston rod, cross-head and crank

THE Rand Drill Co., manufacturers of rock drills, air compressors and general mining machinery, 23 Park Place, New York, report that they are very busy. The machinery made by this company is extensively used in every mining district of this country, and recent shipments have been made to Mexico, South America, China, Japan and South Africa.

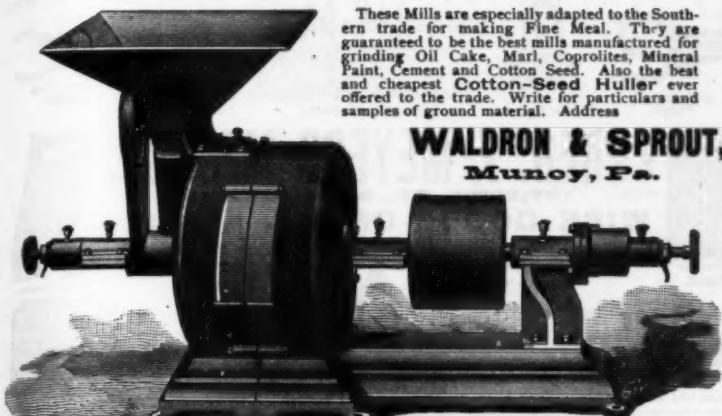
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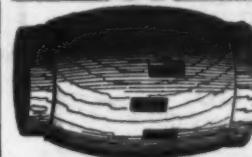
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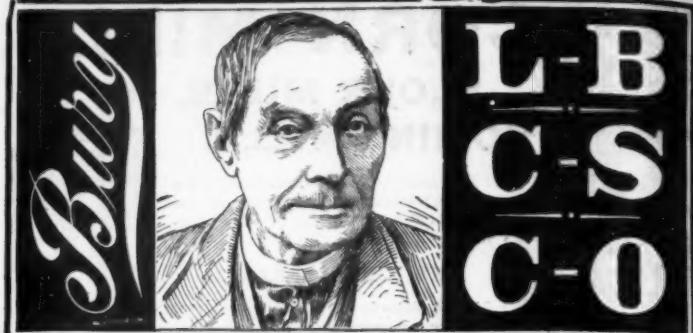


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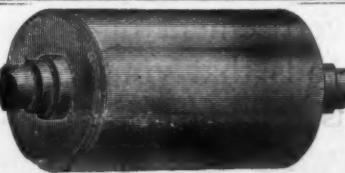
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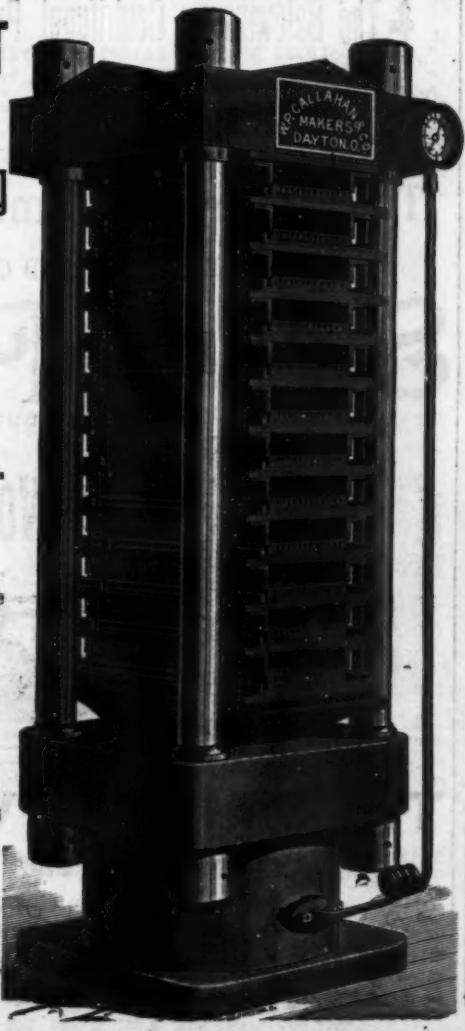
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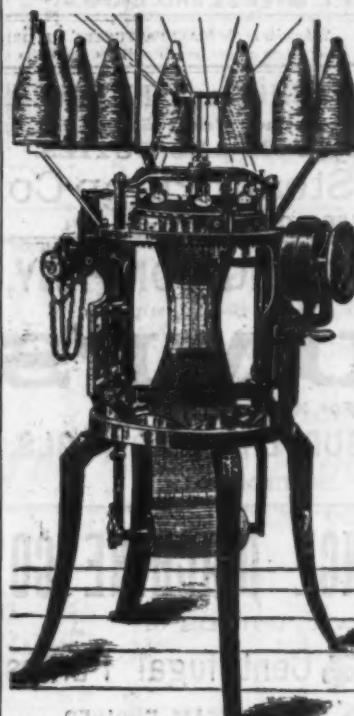
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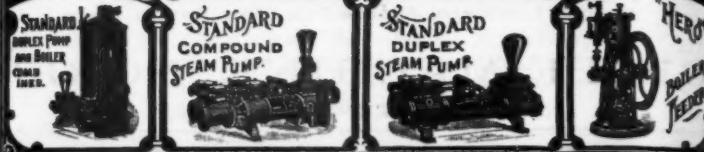
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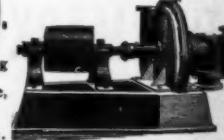
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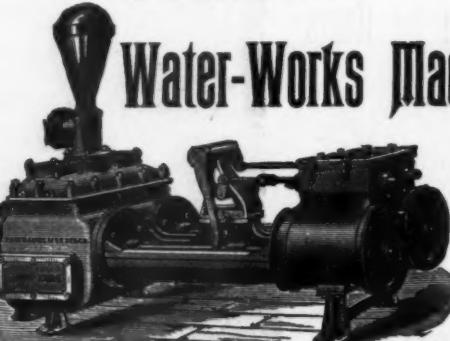


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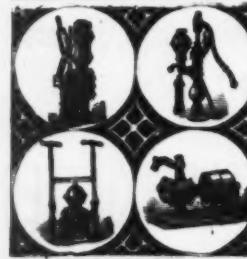
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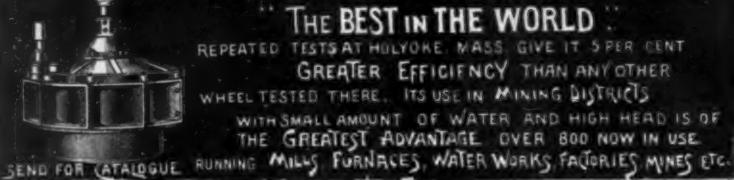
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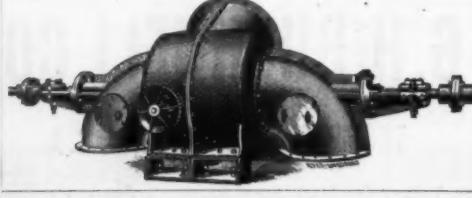
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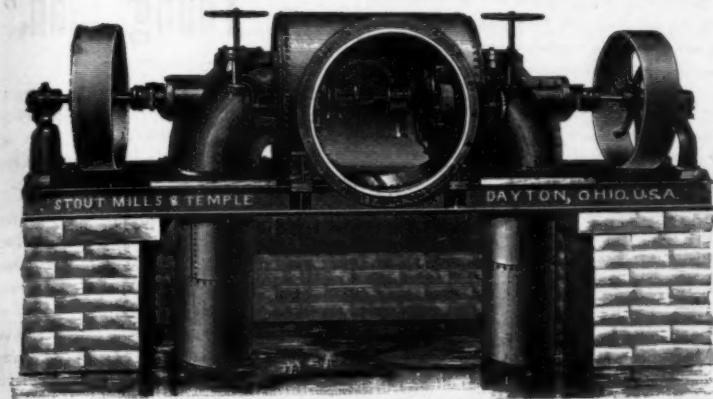
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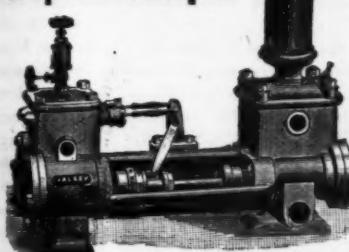
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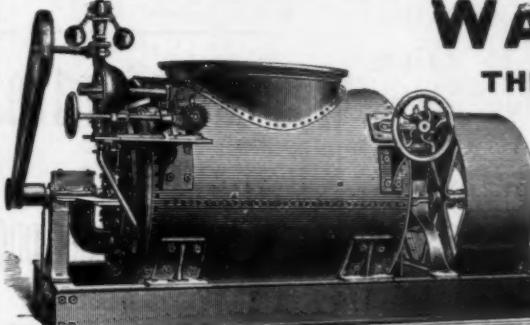
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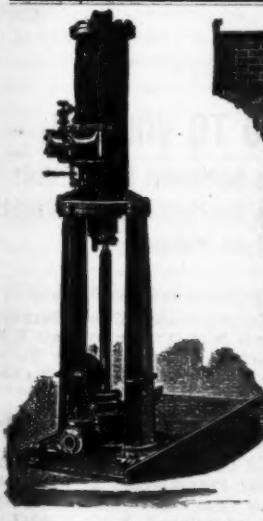
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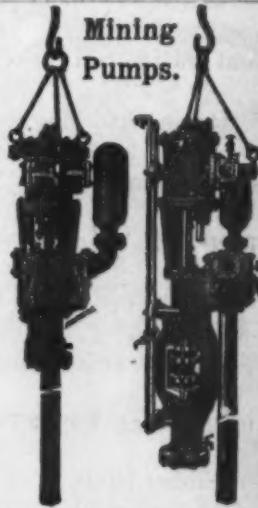
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Owners or agents of large properties in the South, especially of coal, iron and timber lands, who desire to sell or secure their development through outside capital are invited to send me brief, clear statements of the location, extent, resources and price of their properties.

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Having had long experience in handling large American properties in London, and also in this country, I am in a position to secure investments in gilt-edge Southern mineral or timber lands.

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Within a few miles there are six lines of railroad, the nearest being the Brierfield Standard Gauge Railroad, two miles distant, and the L. & N. branch at Blocton, three miles distant.

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"The net results of this visit to the South, to my mind, is just this—that THE SOUTH IS THE BONANZA OF THE FUTURE. We have developed all the great and sudden opportunities for wealth—or most of them—in the Northwestern States and on the Pacific Slope, but here is a vast country WITH THE BEST CLIMATE IN THE WORLD, with conditions of health which are absolutely unparalleled—with vast forests untouched, with enormous veins of coal and iron which yet have not known anything beyond their original conditions, with soil that, under proper cultivation, for little capital can support a tremendous population; with conditions in the atmosphere for comfortable living winter and summer which exist nowhere else in the country; and that is to be the attraction for the young men who go out from the farms to seek settlement and not by immigration from abroad, for I do not think they will go that way, but by the internal immigration from our own country it is to become in time as prosperous as any other section of the country and as PROSPEROUS BY A PURELY AMERICAN DEVELOPMENT."

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The Case Manufacturing Co., Columbus, Ohio:

GENTS—We started mill July 7th. The 12 pair 9x18 rolls you furnished us worked perfectly. They are so easy to adjust, so simple to handle, feed so regularly, grind so nicely and even, and work so smoothly on the whole, that we have no hesitancy in stating that we cannot see how they can have a superior, if equal. Aside from their perfect work, they are models of beauty and finish, and a decided ornament to any mill. We enclose clippings from papers. We are, with best wishes.

Very truly yours,

BAUER & BUHRER.

For full particulars regarding the best FLOUR OR CORN MILL MACHINERY, address



THE CASE MANUFACTURING CO., Columbus, Ohio.

Plant of the Foos Manufacturing Co.

The cut here represents the new factory of the Foos Manufacturing Co., Springfield, Ohio, which was completed and

der the direct supervision of members of the company, so the greatest care is used in every department to give all customers the best possible service; not even the smallest detail is slighted or neglected.

The warehouse and foundry are yet to

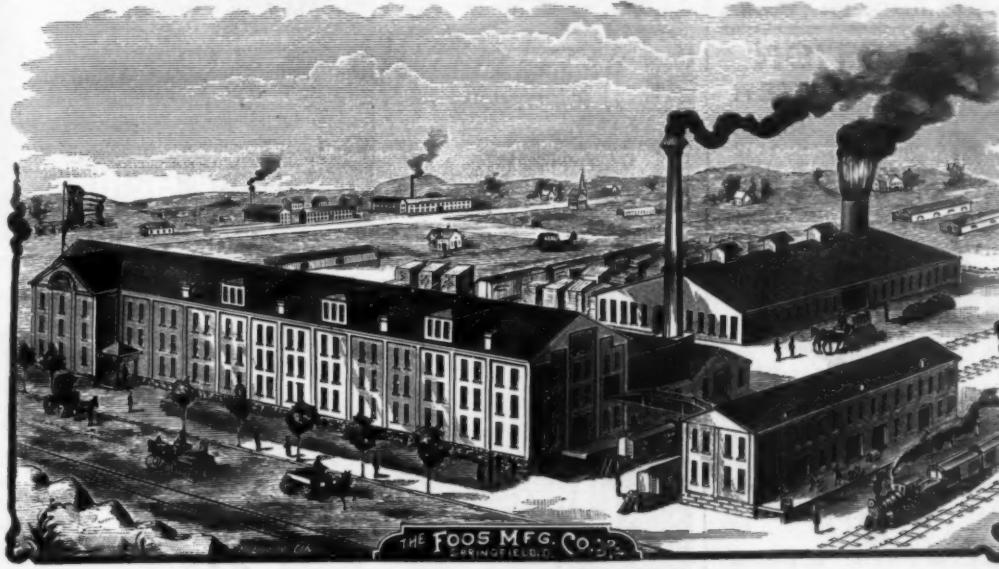
nicely fitted into large sockets, the sockets being fastened on cross-bar by strong screws. The shaft is 5½ inches diameter, is solid steel, and passes right through both housings, having clutch and gear wheel on one end and a number of holes or ports to

would naturally come and provided with two nuts on each end, the two nuts resting on each side the housings, holding them firmly in their places and also serving the purpose of adjusting slides to perfection.

The punch-bar, holding punches and upper shears, as well as the die-bar underneath, holding the dies, are both detachable from the cross-bars, in order to admit more easily any number or shape of punches, dies or shears and at such distances as suit the requirements. A pressure-bar is also attached to the punch-bar, which has a double mission. In the first place it strengthens or holds the material down tight while punches and shears are passing through the material, and in the second place is acting as a stripper or take-off, leaving the die-bed free from obstructions and rendering it easy to take work out and in.

The clutch is operated either by foot or hand, or both—the long treadle running the whole length in front of the machine is for foot operation; the lever to the right is intended to move by hand. The latter is very convenient when using machine only on one end. The opening between housings is 6 feet, but the whole machine can be made shorter or longer as may be required; also the distance back from center of punches can be increased.

The machine is used for punching and shearing railroad cattle guards. It shears or cuts off both ends at an angle of 45 degrees of a bar 9 feet long, 4 inches wide and ¼ inch, thick and punches a number of holes at the same time to receive the connection bolts. The machine is well



occupied by the company January 1st, 1890. This is a very complete factory, and even in that city of fine factories is considered a model. It is devoted largely to the manufacture of the Scientific feed mills, which have earned an enviable reputation in every section of this country. The company make numerous sizes of these mills adapted to light and heavy steam, water and other power, with capacity ranging from 5 to 100 bushels of grain per hour. They also make sweep or lever mills for two horses to grind ear corn and small grains; also a full line of special mills for crushing and grinding bones and fertilizer materials of all kinds. In addition to mills, they also manufacture horse-powers, corn shellers, a full line of portable forges, blowers, &c., and farmers' tools, consisting of a well-selected assortment of hammers, pincers, tongs, &c., suitable for use of farmers and stockmen for doing blacksmith work at home. The factory is equipped with the latest and best machinery, adapted especially for making these goods, and the buildings themselves have been erected with special reference to such work, while no expense has been spared in providing every possible facility for their rapid and economical production. Goods are shipped to all parts of the globe.

The main building is 230 feet long by 60 feet wide, with four floors and basement 9½ feet high. The offices occupy 30 feet at the north end, at which point the building is 68 feet wide. The offices are equipped with every facility for the rapid, prompt and correct attention to correspondence and shipping; thus the wants of customers are carefully considered. All work both in the office and factory is un-

be erected, but when completed, the warehouse will be 125x50 feet, and the foundry 150x80 feet.

The machinery is moved by a Russell automatic engine of 125 horse-power, with Babcock & Wilcox boiler of 150 horse-power.

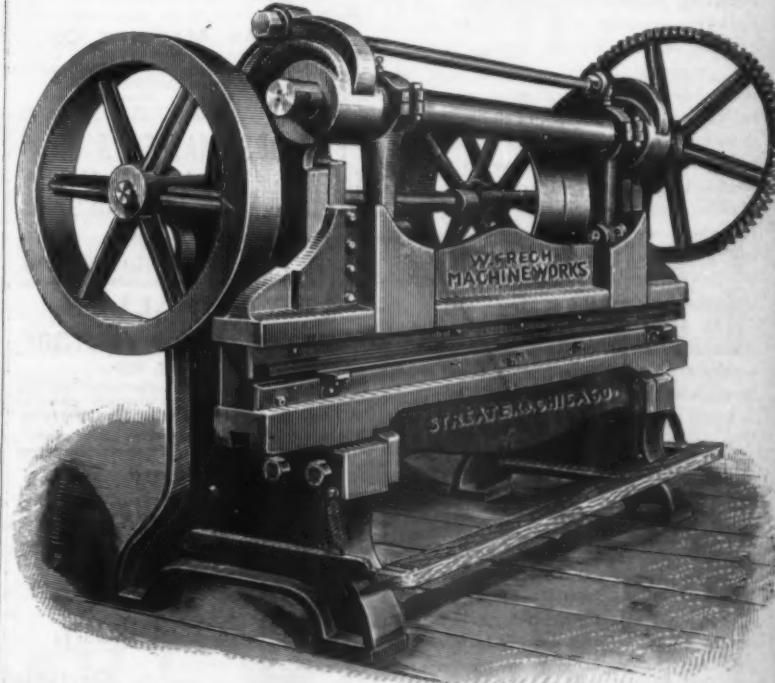
Punching and Shearing Machine.

The W. Frech Machine Works, of Streator, Ill., and 68 and 70 West Monroe street, Chicago, have just turned out and put on the market a new punching and shearing machine for punching and shearing bar iron and steel. This machine cuts off bars of iron and steel 9 feet long, cuts both ends at an angle of 45 degrees and punches a number of holes at the same time. It is 4 inches from center of slide-back to housings, and is so arranged that any length can be cut off either straight or at any angle desired.

The cross-bar carrying punches and shears is so designed that the strain is equally divided along the entire length, so that the strength of the extreme ends fully equalizes the strength at the center of the bar.

The guides or slides are fastened on cross-bar in a manner that does away with all gib and gib-strews, resting on the back against a straight, solid surface and being sufficiently long enough to remain in the housings the full planed surface, even when cross-bar is at its lowest extremity. The guides are further so arranged that all wear can be taken up easily without gib or gib-screws, which renders the whole machine very effective and durable.

The two pitmen are at their lower ends



NEW PUNCHING AND SHEARING MACHINE.

receive a lever for moving by hand on the other.

The tight and loose pulleys are 30 by 8 inches face, running on a 2½-inch steel shaft, on which on one side a 750-pound flywheel is attached and on the other side a pinion driving the big gear. The stay-rod on top is located in the exact position where the principal side or end pressure

adapted for punching, shearing, notching, forming, grooving, perforating, etc., sheets and bars of any required length, thickness and kind of material. It will make from 15 to 20 strokes per minute, but can easily be speeded to suit the nature of the work, and is, in short, a well-designed, strong and powerful machine, which will be very useful and save a great deal of labor in iron works for manufacturing specialties in general.

The Markets.

OFFICE MANUFACTURERS' RECORD,
BALTIMORE, September 24, 1890.

All advices up to present writing confirm previous statements as to volume of business and steadiness of prices. So far as experienced and conservative iron and steel makers are able to forecast the situation, there is very little probability of any change in the volume of business done or in the prices paid. Buyers feel safe in contracting as far ahead as they feel inclined to, but manufacturers see no particular advantage in booking orders now for material that will not be wanted for six weeks or two months. The situation is strong. Manufacturers in all departments have plenty business. Consumption is increasing for all products of furnaces and mills. Prices show very little change. In Southern centers great activity prevails. Prices are well sustained. A number of furnaces are nearing completion. The recent projection of new furnaces indicates that capitalists are not losing faith in the future of the iron industry in the South. Tidewater quotations for No. 1 f.oundry are \$18 to \$18.25; No. 2 \$16.50 to \$17, and gray forge \$15 to \$15.25. Mill quotations for muck bars are \$30 to \$30.50. Merchant iron makers are doing a heavy business at 1.80 to 2 cents, and the prospects are excellent. Nail makers in Pennsylvania are quoting cut nails at \$2. Sheet iron of all kinds is scarce, the September demand having run prices down. Card rates may be advanced next month. The skelp iron makers are oversold as usual, and pipe and tube makers have all the work they can handle. In fact, in no department of the iron trade is there any complaint of dullness. Now that the financial flurry is over—at least, for a while—certain large buyers of iron and steel products, who were afraid to rush in heavy orders, are now asking for figures on pipes, plate and shaped iron. Steel rails are quiet, and are quoted at \$31, but large buyers, that is, companies who want 5,000 tons or more, will not pay that mill price. Several Southern railroad companies are in the market for new material, including locomotives and cars. The railway companies will be heavy buyers this fall and winter. Bridge builders are preparing to do a great deal of work, and the structural mills are oversold. Prospects are bright for a steady demand for some months to come. Car-builders are making contracts for winter work. Locomotive builders are all busy. Hardware manufacturers are making pretty full time. Carriage and wagon manufacturers are doing a good business. Under this general activity the iron trade is making good headway.

The financial disturbances fortunately did not last long enough to make any impression on the iron trade, and manufacturers have confidence that no stringency is likely to occur that will do them harm. The country wants good material, and it will be made and sold and paid for.

HARDWARE.

There is considerable complaint from the trade, caused by the difficulty in having their orders promptly filled. Nearly all the manufacturers are behind in filling orders. The demand for goods is not as pressing as it has been for the past month, and this feature will enable the manufacturers to catch up with their orders. Prices are very firm on all kinds of heavy goods. Nuts, washers, etc., have advanced a few points. Common carriage bolts are now 70-10 and 5% discount instead of 70-10-7 1/2%. Higher prices on leading lines may be expected until the manufacturers commence to accumulate stock. The chain market shows more firmness than at any time during the year. Brass and copper goods of

various kinds are firm. Copper pipe and bars are regarded as a good purchase at present prices. The screw market is not in a healthy condition, as several small makers are quoting cut prices, which have not been met by the larger makers, but they are becoming very restive under repeated cut in prices.

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44 Wall Street, NEW YORK.
Correspondence of Furnaces Invited.

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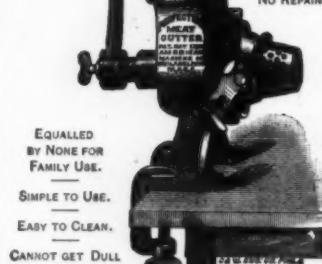
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CUTS
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SIMPLE TO USE.
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CANDY'S AMERICAN COTTON BELTING
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This Belting and Lace Leather is not affected by steam or dampness; has more grip than any other; never becomes hard; is stronger, more durable and the most economical Belting made. Especially adapted for the Southern trade on account of its resistance to moisture. The Rawhide Rope for Round Belting Transmission is SUPERIOR TO ALL OTHERS.

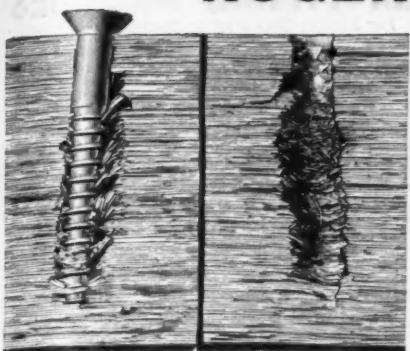
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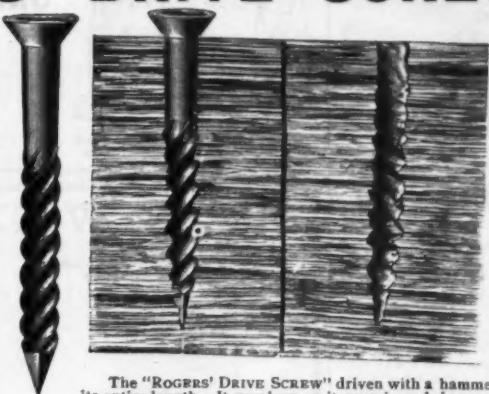
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"ROGERS' DRIVE SCREWS."

Patented May 10, 1887; July 10, 1887;
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A common cut thread screw as ordinarily inserted—i.e., driven two-thirds of its length with a hammer and the balance with a screw driver. Fibres of the wood are necessarily broken, and the holding power of the screw much impaired.



The "ROGERS' DRIVE SCREW" driven with a hammer its entire length. It revolves as it goes in and does not break the fibres of the wood, but makes its own nut of the cavity it forms.

WIER & WILSON, Agents, Baltimore, Md.

The foregoing illustrations speak for themselves, but we call attention to a few advantages of the "ROGERS' DRIVE SCREW."

1. Stiffness, adapted for driving with a hammer.
2. Rapidity of insertion.
3. Increased holding surface.
4. Ability to be driven with hammer and withdrawn with screw driver numerous times from same hole.
5. Superior head, which will withstand blows of a hammer and not impair the slot.
6. Improved slot, admitting the use of a heavier screw driver.

7. A Rogers' Drive Screw of small diameter will hold as much as a common screw of a larger diameter.

Discount 66 2/3 per cent. from list of common screws.

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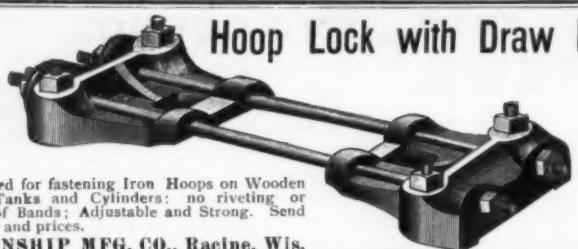
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BUY **Cheapest** FROM **MAKER** **STEEL** **WRITE**
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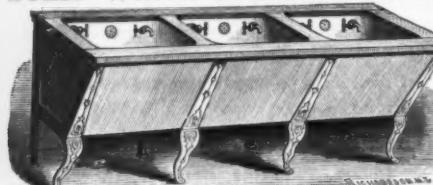
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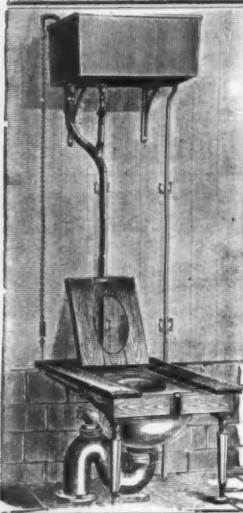
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Short Neptune Hopper and Trap

WITH FORE AND AFTER FLUSH TANK
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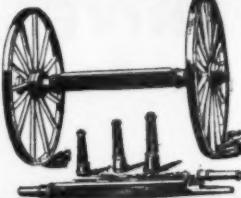
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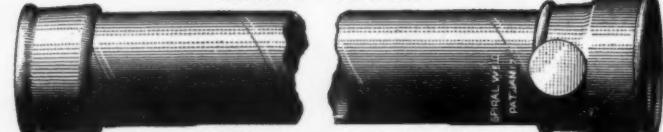
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Southern Agents.

Eastern Lumber Markets.

[Special Cor. MANUFACTURERS' RECORD.]

NEW YORK, September 23, 1890.

The lumber market has gained some unexpected strength during the past few days from causes which it is not always possible to foresee. Two or three weeks ago, as we now learn, three or four large wholesalers endeavored to close contracts for large stocks of hardwoods, most of it dry and all of it supposed to be readily salable. In the meantime, however, some Western parties, so the story goes, happened along and made better offers, at least enough better in the respect to cash payments to make their offers more desirable. The lumber will not come this way; it will stay where it is. The loss of it will not be felt, as there is no small quantity on hand, but it will necessitate some more careful looking around and give a chance to other saw mill men. Everybody is pushing ahead. Work is coming up, and there will be plenty of it this winter. Prices for hardwood especially will be strong if it is dry and all right. Much depends on quality. This is particularly true now. The market for inferior stuff is poor. We have worked off a good deal of poplar, and new stuff is due here next week. The demand for oak is active, even at the strong prices asked for it. Good plain oak is also doing well. Particular interest is felt just at this time in Southern long and short-leaf yellow pine. A few shipments were recently made here on consignment and did not find ready purchasers, as the consignees either did not understand the market or prices. It is no use to ask a dollar above the standard price unless there is evidence that the seller has some very superior stuff, and that is seldom the case. North Carolina pine continues to arrive in good quantities, and we hear of no change in prices. The manufacturers are keeping a close eye on the market. The country trade in both Georgia and North Carolina pine has been first-class this month, and some good shipments have been made to interior New England towns.

Cherry is wanted by cabinetmakers. Ash has been selling well among the trade. Walnut is very dull except for export, and the foreign demand still continues quite heavy. Building is active. Builders are hurrying along as quickly as possible. The Philadelphia and Boston lumber markets are active and all kinds of stuff are moving along freely. Tonawanda, Albany and Buffalo markets are active, and people there and elsewhere seem to be getting ready for winter long in advance. The financial disturbances in Wall street never affected the lumber trade. Lath and shingles have been moving off quite briskly. Stocks are ample. All our local dealers will enter upon the winter season with liberal stocks of all kinds of lumber. Steady prices and a steady demand seem to be the general expectation.

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THAT COST \$6,000.

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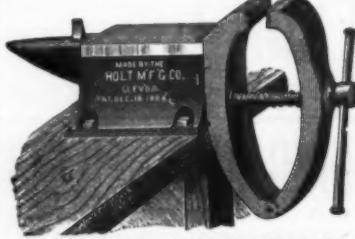
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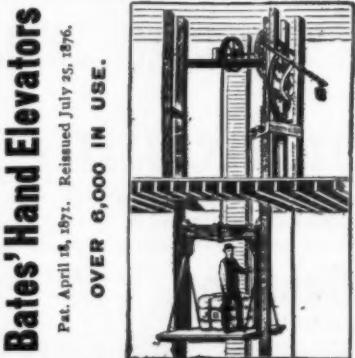
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| 7x2 $\frac{1}{2}$ | 1 | 4 $\frac{1}{2}$ | 1 10 | 2 20 | 3 00 | 5 75 | |
| 8x2 | 1 | 5 | 1 40 | 2 80 | 3 75 | 6 75 | |
| 8x2 $\frac{1}{2}$ | 1 | 5 $\frac{1}{2}$ | 1 75 | 3 50 | 4 50 | 8 25 | |
| 9x3 | 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ | 8 | 2 50 | 5 00 | 5 50 | 10 50 | |
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PIPESThe best for
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BUY AND SELL Second-hand Saw, Stave, Heading, Shingle, Hoop Mills, Engines, Belts, Chain and Ice Machinery, See CATALOGUE Address Box 156, Cleveland, Ohio.

Wood Water Pipe.

A. Wyckoff & Son, of Elmira, N. Y., manufacturers of wood water pipe, have reached the 36th year of their existence as a firm.

The pipe, Fig. 1, made by this firm is of sound white pine timber, selected, free

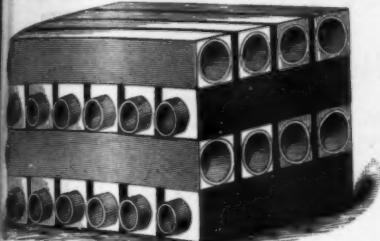


FIG. 1.—WOOD WATER PIPE.

from sap, of any desired caliber up to 4 inches, varying in external dimensions from $3\frac{1}{2}$ inches to $9\frac{1}{2}$ inches, proportioned to the diameter of the bore and the pressure it will be required to sustain. They are



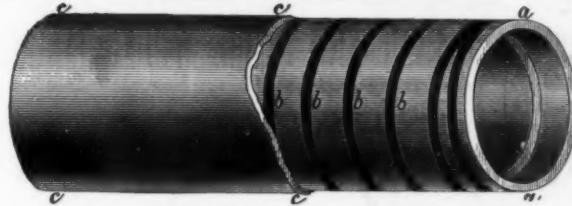
FIG. 2.—WOOD WATER PIPE.

made in lengths of 6 to 8 feet each, connected by a socket joint, perfectly water and air tight, and can be easily and properly put together by any ordinary laborer, and requires no preparation, being simply

J. S. GRAHAM & CO., Rochester, N. Y., manufacturers of woodworking machinery, report that they are very busy. The third lot of the Goehring geometrical moulding machines have been finished. Another lot is in course of construction. This is a mammoth machine, weighing 17,500 pounds and is 18 feet long, and can now be seen on exhibition at St. Louis, Chicago and Toronto expositions; one will also be exhibited at the Mechanics' Institute, New York city. The workmanship is of a high standard of excellence. The firm at the present time are busy on orders from the Ohio Falls Car Co., Jeffersonville, Ind.; A. B. Williams, Ira M. Rose, Orren Weston and Homer & Daniels, of Tonawanda, N. Y.; F. W. Ayer & Co., Bangor, Me.; Harmer & Billings, Bayonne City, N. J.; E. T. Hazeltine, Warren, Pa.; H. A. O'Connor & Co., Rochester, N. Y.; St. Lawrence Boom & Manufacturing Co., Ronceverte, W. Va.; Columbia Furnace & Manufacturing Co., Columbia, S. C.; Charles Wood, Amityville, L. I., and others. Among the new machines recently brought out by Graham & Co. are a heavy gang ripping machine, resawing machines and an improved fast-feed flooring machine, all of which have new and special features that commend them to the trade.

A. N. SIMMERLY, of Cleveland, Ohio, informs us that his business has been merged into a stock company to be known as the Simmerly Derrick Co., with ample working capital. This company makes a specialty of derricks and machinery for stone and marble mills, and are prepared to fill all orders promptly. Mr. Simmerly is superintendent of the company.

BROWN BROS. & CO., general mill furnishers, of Providence, R. I., have issued a

a Wood. b Hoop-iron bands. c Asphaltum coating
FIG. 3.—STRENGTHENED WATER PIPE.

driven together. They are all banded at chamber end, which prevents them from splitting when driven together. The plain square water pipe is very cheap and reliable pipe for conveying water, and when laid in wet soil is very durable. For dry, sandy or gravel soil the round and coated water pipe, as shown in Fig. 2, is said to be well adapted.

This style is made in the same manner as the strengthened water pipe, excepting they are not wound with hoop-iron.

This pipe, Fig. 3, is made in lengths of 6 to 8 feet of white pine, bored the desired size with a patent auger, making a perfectly smooth bore. The pipe is then turned in a lathe, removing all the sap, leaving a shell the required thickness. It is then placed on the banding machine, where it is banded with hoop-iron spirally wound and pressed on tightly. The hoop-iron before being wound on the pipe is passed through a preparation of cement, thus giving it a coating on the under side as well as on the outside. The nearness of the bands to each other and the weight of the hoop-iron are regulated by the pressure the pipe is to sustain. The pipe is then thoroughly tested under hydraulic pressure. It is then coated with a heavy coat of asphaltum. They are connected by a socket joint, which is air and water tight.

THE Aetna Machine Co., of Warren, Ohio, lately closed a contract for a 250 horse-power engine to drive a train of rolls in Messrs. C. W. Tuttle & Co.'s mill at Auburn, N. Y.

complete catalogue of mill furnishings, containing useful rules and tables for cotton, woolen and silk manufacturers. This is a handsome volume, 16mo, 512 pages, with 3,300 engravings; price \$3, but is issued to customers of the firm free.

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About twelve acres of land, a three-story brick building, eighty horse-power engine and boiler, with other machinery complete. Price \$20,000. Apply to W. C. McCall, Quitman, Ga.

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7 Horse-Power

Otto GAS Engine

IN FIRST-CLASS ORDER.

Apply to RECORD PRINTING HOUSE, Exchange Place and Commerce St., Baltimore, Md.

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ANNISTON, ALA.

OCTOBER 1, 1890.

Under an order of the City Court of Anniston, as administrator of E. E. Murray, deceased, and by power of attorney from the heirs of Hugh Stevenson, deceased, will sell at public outcry at Anniston, Ala., on **Wednesday, October 1, 1890**, at 12 o'clock M., the Murray & Stevenson foundry and machine shops. Terms, one-half cash, balance in 12 months with interest. This property consists of one and a quarter acres of land located between Tenth and Eleventh streets and between the G. P. and the Alabama Mineral Branch of the L. & N. R. R., and is about one block from the E. T., V. & Ga. Railroad. It has a foundry building 80x130 feet; two cupolas, capacity seven and eight tons; two cranes, equipped and in good working order; one Baker blower, one 25-horse-power engine and 35-horse-power boiler. In the foundry are patterns, consisting of railroad patterns, furnace, house, gearing patterns, and several thousand dollars' worth of miscellaneous patterns. The foundry is well equipped, finely located in the rapidly growing city of Anniston, Ala., surrounded by a rapidly developing mineral region, and the railroad connections, in addition to the local demand, will furnish all the work which the foundry can do, running on full time all the year. In addition to this foundry plant, on the same lot are machine shops, having one 36x15 lathe, two 18x10 lathes, one Prentiss drill press, one large planer, one 15 Hendey shaper, one emery stand, one grindstone, two engines (nearly completed), 15 and 20 horse-power, besides a full line of all tools and implements necessary to a well-equipped machine shop. This sale is to be made for the purpose of closing up the partnership business of the late firm of Murray & Stevenson, both partners being dead. This plant has done a business exceeding \$100,000 per annum, and with additions and improvements, for which there is room on the lots, this can be doubled, and all the work can be had. The climate is such that the plant can be operated every day of the year. Titles perfect.

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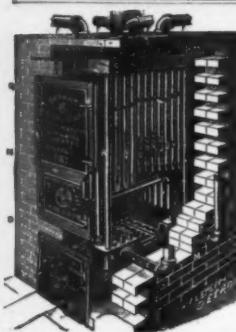
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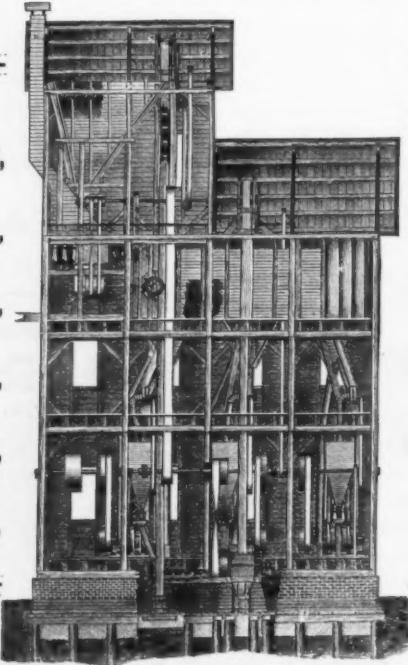
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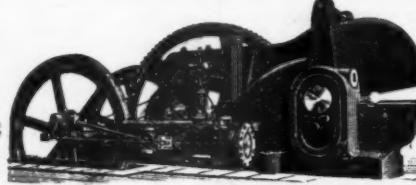
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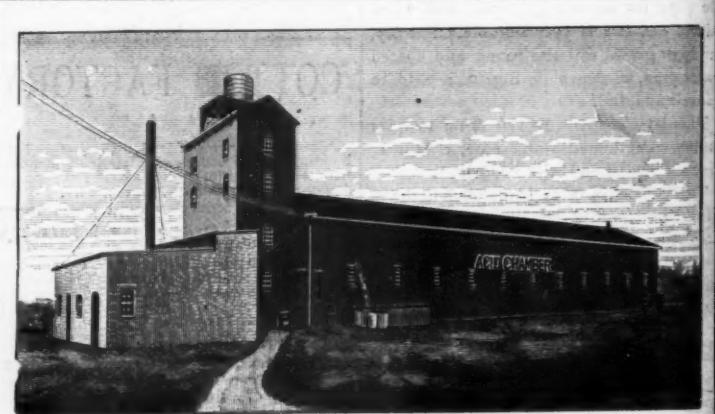
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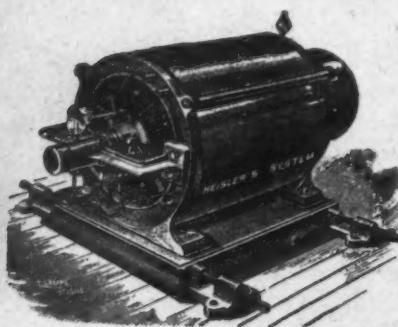


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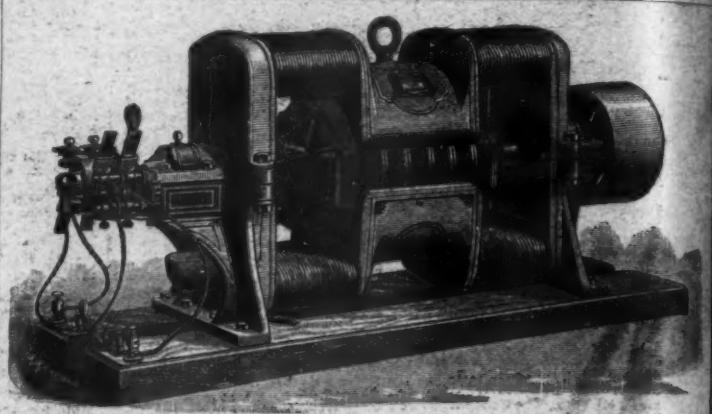
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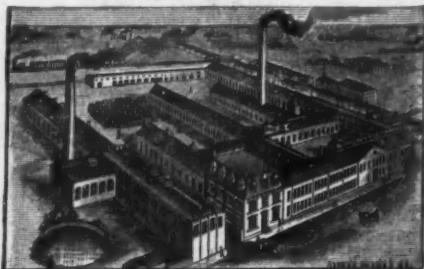
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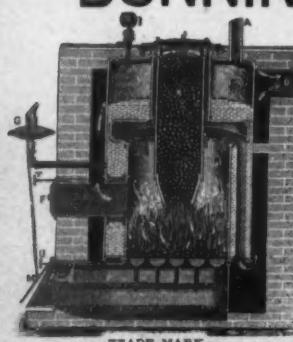
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